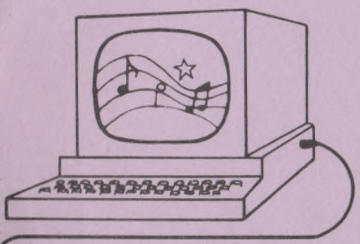

Dr. T's MUSIC SOFTWARE

FULFILLING THE PROMISE OF MIDI!

KEYBOARD CONTROLLED SEQUENCER™
for C128 Computer

USER'S GUIDE

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Dr. T's Music Software reserves the right to make changes to this program without notice to previous purchasers, and to impose what it considers to be reasonable charges for program updates.

BACKUP DISKS

Original purchasers of the C128 KCS are entitled to one free backup disk, which they can obtain by sending the note or warranty card as described above. Backup disks will not be shipped until we consider the program fully 'shaken out'. If you insist on obtaining one sooner, we shall have to charge you for the final update. User's who have updated from the C64 program can obtain a backup disk for $5.00 plus their C64 KCS backup disk, or $10.00 if they never purchased a C64 backup. They MAY NOT keep their C64 backup and purchase a C128 backup.

There is a charge of $15.00 for backup disks ordered more than 60 days after program purchase, or for the replacement of program disks that become defective more than 60 days after purchase.

TECHNICAL ASSISTANCE

If you are experiencing difficulties and cannot resolve them from reading the manual call DR. T'S MUSIC SOFTWARE SUPPORT at (617) 244-6954 between the hours of 10AM - 5PM (EST) Monday - Friday. We must have your warrantee on file to answer questions. Please have your disk serial # available for verification when you call for assistance.

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Manual written by Mark Styles and E. Tobenfeld
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GETTING STARTED - HOW TO USE THIS MANUAL

The KEYBOARD CONTROLLED SEQUENCER is a program which performs several independent, yet inter-related functions. Some functions you will use quite frequently, others only occasionally, and perhaps some not at all. Such a wide variety of options may make the program difficult to learn at first.

We recommend you read through the DESIGN OVERVIEW and the TUTORIAL, trying the features as you go. Refer to the other sections when you want to know more about a specific function. In between sessions with Dr. T's Keyboard Controlled Sequencer, read through Chapters 4 - 7.

Once you become familiar with all the features of the KEYBOARD CONTROLLED SEQUENCER, you will develop your own method of using it, depending on the equipment you are using and your approach to music. As with any complex system, it takes time to come to a complete understanding of all the parts and how they may be used together.

It is wise to periodically SAVE A COPY OF YOUR WORK TO DISK in case of an accident. Before you start creating a lot of sequences, INITIALIZE A FEW BLANK DISKS TO STORE YOUR SEQUENCES ON. You may initialize disks using the DISK function (option 7 on main menu). Until you have a basic understanding of operation, we recommend that you USE THE KEYBOARD CONTROLLED SEQUENCER WITHOUT A DRUM MACHINE.

NEVER INSERT OR REMOVE THE MIDI INTERFACE WHILE THE COMPUTER IS ON. If contact is momentarily broken on certain pins between the interface box and computer, severe damage may result!

EQUIPMENT HOOK-UP

Depending on the equipment you have, there can be several ways to connect the various synths, drum machines, sync boxes etc. See Appendix - EQUIPMENT HOOK-UP. NOTE - if you are using a Sequential Model 64 MIDI interface, you must cover pins 8 and 9 with a piece of transparent tape. This is the only way to get the computer to boot in the C128 mode with the interface inserted.

ADDITIONAL MIDI OUTPUT

We may attempt to support a second MIDI output that runs at one-half the usual baud rate and connects to the RS-232 port. This would provide an additional 16 MIDI channels, and help to reduce 'MIDI overload' problems. If we do so, the price of the software update and interface combined will be about $75.00. Please let us know if you are interested.

DESIGN OVERVIEW - SEQUENCE DEFINITION

The C128 KCS contains 128 sequences and can record approximately 12,000 MIDI events. A sequence may contain any type of MIDI data or a start, stop or mute command for another sequence. Two types of sequences exist, PRIMARY and SECONDARY. There are 35 PRIMARY sequences, and they are designated by the single numerals 1-9, and the letters A-Z. PRIMARY sequences can be started and stopped in play mode by pressing the appropriate one digit key. The remaining 93 sequences are called SECONDARY sequences and are desiginated by two

digit numbers, from 00 through 92. These sequences may be started from the computer keyboard by pressing the LINE FEED key followed by two digits. The playback of both PRIMARY and SECONDARY sequences may be independently controlled in real-time using the computer keyboard, and as many sequences as desired can be played simultaneously.

MIDI events recognized and transmitted by the KEYBOARD CONTROLLED SEQUENCER are: note on and off, pitch bend, channel pressure (after-touch), control change, and program change. To save memory, note ON and OFF events can be recorded separately from other MIDI events. MIDI DATA may be filtered out of a sequence also. MIDI channel information is recognized and you may send single MIDI bytes or system exclusive information to any synthesizer, by inserting this data into sequences using the EDIT mode.

EDIT FUNCTIONS

A very extensive EDIT mode lets you make individual or global changes to pitch, duration, velocity, MIDI channel, and timing for all notes in a Sequence. A split screen will display all edit options on the right half of the screen. This display remains on the screen while list, edit and play operations are performed.

Edit commands consist of Backup a sequence, Copy, Delete, Move, Insert, Play, List (to screen or printer), Switch MIDI channels, retrieve a backup sequence, set Repeats, Extend a sequence. More advanced Edit commands are Filter MIDI data, Algorithmic Edit, and Transpose/Auto.

Various options within the Algorithmic and Transpose commands may be applied to all or any part of a sequence by specifying line #'s, measures, or using selection criteria. Selection criteria may consist of particular notes on a certain MIDI channel, or only notes within a certain pitch, velocity, duration or time range. Other criteria are position on a chromatic scale, selected probability, or every N'th note. These are described in detail in Chapter 4.

PLAY SCREEN

The PLAY screen will display the status of four sequences on each line. Each sequence will display it's current number of repeats left to play, and if it is currently in a WAIT or MUTE state. If the sequence is being called by another the sequence, the letter of the calling sequence will also be displayed.

The current status of up to 84 of the 128 sequences may be seen at one time. The status of higher numbered secondary sequences will not be shown, so you may want to avoid using them when they are not needed.

The C128 program allows you to enter ten lines of text comments. The program will display five of these lines on the play screen itself. All of the text may be viewed and edited on a TEXT page. You can specify the number of lines to be displayed on the play screen from the initialization program. Obviously, as you display more lines of text, you have less room for sequence status data. The top line of text is initialized to dashes by the program. This provides a separation between the two main sections of the play screen.

The bottom two lines of the play screen are used as status lines. They contain the measure counter, and the clock source and rate. The words RECORD, CUE,

COUNTIN, MIDI THRU, PAUSE etc. will appear on the status lines when these features are activated, and disappear from the status lines when the are de-activated.

USING THE COMMODORE KBD

The Commodore 128 keyboard consists of a basic typewriter layout with a row of keys above, and a calculator keypad to the right. Dr. T's KEYBOARD CONTROLLED SEQUENCER uses several different MENUS to provide various options. Be sure the 40/80 DISPLAY key is down, and the SHIFT LOCK key is off (up position), otherwise the keyboard will appear to be non-functional.

NOTE - when you are using a menu which has no blinking cursor, (the MAIN MENU for example), only one key is required to select a function. You do not need to press (RETURN). When a menu has a blinking cursor then you need to supply a key or a value, and a (RETURN) to complete the action (such as designating a Sequence key for CREATE NEW SEQUENCE).

An invalid selection in the MAIN MENU or MENU 2 is ignored. The computer will wait until you select a key corresponding to a valid option. An invalid selection on the other menus will usually result in the message INVALID ENTRY at the bottom of the screen for two seconds.

Whenever you select an option that will erase or modify a large amount of data such as a previously recorded sequence or file on the disk, the computer will ask ARE YOU SURE? Pressing the Y key will proceed with the operation. Any other key will exit to the previous menu, making no changes. You may defeat the ARE YOU SURE? question when initializing the system. (We reccomend this only to experienced users).

FUNCTION KEYS AND FOOTSWITCH

The row of four keys at the top right of computer keyboard, above the calculator keypad are called FUNCTION KEYS. They are used in play, real-time & step-time record, and overdub.

F1 stops execution of the current command and exits to the previous function.

F3 toggles ALIGN mode on/off. When recording, ALIGN causes the sequence to be a whole number of measures long. In the play mode, ALIGN causes all sequences to start a whole number of measures after the the first sequence was started. In step-time, F3 resets the time of the next note to the currently selected time value.

F5 CANCELS all sequences when in play, record, or overdub. It also erases any sequence currently being recorded. In step-time record, F5 acts as a REST key.

F7 in record, starts and stops the recording process. In overdub, F7 begins a sequence with a rest. In play, F7 controls the real-time repeats of Sequences 1 - 9. In step-time, F7 plays the sequence that has been entered so far.

The FOOTSWITCH, which plugs into the SCI and Model T interface box, duplicates all of the real-time functions performed by the F7 key.

TO ABORT A COMMAND

The LEFT ARROW (upper left of KBD.), F1, 0, and X keys will get you out of situations when you've changed your mind about something.

The LEFT ARROW key stops a listing when in EDIT.
The F1 stops PLAY or RECORD functions.
The F1 aborts any command that requires a sequence key or number.
The F1 and X key exits the EDIT mode.

LOADING THE PROGRAM

Before loading the program, check the EQUIPMENT HOOKUP section in the APPENDIX. The KCS 128 program disk is 'bootable'; meaning; you can load the program by pressing the RESET button on the right of your computer or by powering the computer up with the disk in the drive. If you are already in BASIC, you can load the program by typing RUN "BOOT" (RETURN).

You must have the 40/80 botton pressed down and have a monitor or TV set connected to the RGBI output of the computer. This is about three inches from the left edge on the back of the machine. If you do not have a monitor designed to connect to the RGBI output, you will need to purchase an adapter from your computer store. The program WILL NOT WORK in 40 column mode.

The program will ask which MIDI interface you are using. Respond by pressing "P" for a Passport or Syntech or any other key for a Sequential or Model T. The program will then ask if you want to change any INITIALIZATION parameters. Pressing "Y" will enter INITIALIZATION, any other key will bring you to the MAIN MENU.

ERROR TRAPPING

The program should issue an intellible error message if a disk or printer error is detected. If you receive a message that reads BASIC ERROR mm IN LINE nn, where mm and nn are numbers, you have possibly encountered a program bug. Please let us know about it so we can fix it! The exception to the 'bug' is when you try to do a 'hard copy' and have no printer connected. Pressing any key should get you back to the main menu with no loss of data. If you do find yourself in BASIC, type RUN to continue with no loss of data.

It is good practice for users of any computer program to save data periodically to avoid disaster. It is also a good idea to keep TWO copies of important data, saving alternately onto one copy and then the other.

A TUTORIAL FOR FIRST TIME USER

Since the KEYBOARD CONTROLLED SEQUENCER is a complex program, we will start with a few basic procedures before moving on to the more complex features of the program. Check that your equipment is set up properly (Equipment setup in Appendix) and then LOAD the program as described under LOADING THE PROGRAM in the GETTING STARTED section. You should see the Main Menu displayed.

For the time being DO NOT USE A DRUM MACHINE. When you have mastered the basic concepts, then begin working with your drum machine. If you want to know more about a specific function, read through CHAPTERS 4 - 8.

The main program consists of the MAIN MENU and MENU 2, along with several other screens which will be used for recording, editing, displaying memory maps, etc. The MAIN MENU accesses the seven most used features of the Sequencer.

```
OPTIONS ARE:
1.   PLAY
2.   RECORD
3.   EDIT
4.   COPY/APPEND
5.   MERGE
6.   OVERDUB
7.   DISK FUNCTIONS
8.   OTHER OPTIONS
ENTER OPTION:
```

Select 8. OTHER OPTIONS to access MENU 2 which looks like:

```
OPTIONS ARE:
1.   DISPLAY SEQUENCE MAP
2.   CHANGE STEPS/MEASURE
3.   DEFINE NEW KEY ASSIGNMENT
4.   CHANGE CLOCK
5.   DELETE SEQUENCE
6.   RETRUN TO INITIALIZATION
7.   EDIT TEXT
8.   MIDI THRU OFF
9.   COUNTIN 0
ENTER OPTION:
```

We will want to INITIALIZE A DISK to store song files on. Hit (RETURN) to get back to the first menu and then Select option 7 DISK FUNCTIONS. Next select option I - INITIALIZE DISK. The program will prompt with ALL DATA ON DISK WILL BE ERASED and asks the question ARE YOU SURE? Insert a Double Sided, Double Density blank disk (or one whose contents you don't need anymore) and press Y. It takes about 40 seconds to initialize or format a disk. Attach a blank Label to your disk and write SONGS or SEQS (or whatever you prefer) and return the newly formatted disk to the drive.

If you have a 1541 disk drive, the program will format a disk as single sided. If you have a 1571 drive, the program will format the disk as double sided. Do not format a single sided disk with the C128 KCS. If you do have single sided disks, format them with the C128 running in the C64 mode.

RECORDING A SEQUENCE

We are now ready to record our first sequence. Select RECORD, option 2. The computer will prompt ENTER SEQUENCE KEY. This represents which key is used to identify the sequence. It can be a letter A - X or a number 1 - 9, or 01 - 92. Let's create our first sequence and assign it to key 1. Press 1 (RETURN).

Our next option will be the method for entering notes. We have the choice of real-time recording, step-time recording, or entering events from the computer. Select option 1 - RECORD IN REAL-TIME.

Next will be a list of options representing various types of data to record. For now, use the default setting which records notes only. Press (RETURN).

Next the screen for REAL-TIME RECORD, OVERDUB and PLAY will be displayed. Note that four columns of of sequences can be displayed on each line. Any recorded sequences will be displayed; presently only Sequence 1 is listed (under S column). Next to it will be the value 99, representing the number of REPEATS that have been designated. Later when we edit, we can give the sequence a name and set the repeat value.

```
S RE NAME     P F W S RE NAME     P F W S RE NAME     P F W S RE NAME     P F W
- -- -------- - - - - -- -------- - - - - -- -------- - - - - -- -------- - - -
1 99
```

```
CLOCK:   123 BEATS/MINUTE   MEASURE          RT SEQS 12          F1 TO EXIT
```

Recording with the ALIGN feature will cause the program to wait until the end of the current measure before finishing recording. Press F3 to turn on ALIGN. The work ALIGN will appear at the bottom left of the screen. If you don't use ALIGN you may fix the end or any part of a sequence from the EDIT mode.

When you begin playing on the synth KBD, the METRONOME (bottom right of screen) will start blinking and the MEASURE display will start counting up. An audio signal is output to the Commodore A/V cable.

If, during RECORDING, you make a mistake or wish to start again, press F5 and then the SPACE BAR.

F5 during REAL-TIME RECORD, erases the current sequence just recorded, and stops the internal clock. The SPACE BAR will start the internal clock again. The MEASURE COUNTER will continue from the last measure, but reset itself to 1 and continue counting when you begin playing the KBD.

When thru RECORDING, press F7 or the footswitch to stop recording and begin playback. This sequence will repeat indefinitely until you press F7, which forces 1 more repeat & stops (assuming you are using Sequence keys 1 - 9). Press F1 to return to the MAIN MENU.

EDITING A SEQUENCE

To examine and EDIT the sequence we have just recorded, press 3. In response to the prompt ENTER SEQUENCE KEY, press 1. The next display will list the Sequence number, LAST PLAY ENDED AT (line #), and a menu of 23 options which we may perform.

```
SEQ 1          PLAY ENDED AT 14

(A)LGORITHMIC EDIT   (P)LAY EVENTS
(B)ACKUP SEQUENCE    (Q)UICK LIST/EDIT
(C)OPY EVENTS        (R) SET REPEATS
(D)ELETE EVENTS      (S)WITCH CHANNELS
(E)XTEND SEQUENCE    (T)RANSPOSE/AUT
(F)ILTER MIDI DATA   (U)P PAGE
(G)ET BACKUP SEQ     (V) DOWN PAGE
(H)ARD COPY          (X) EXIT
(I)NSERT EVENTS      (Y) CLEAR DELETES
(L)IST AND EDIT      (Z) EDIT NEW SEQ
(M)OVE EVENTS        (*) PLAY FROM CUE
(N)AME SEQUENCE      (@) STEP-TIME
                     (!) MAIN MENU

PRECEDE OPTION WITH M TO SPECIFY
MEASURE RANGE

END A OR T COMMAND WITH F1 TO
USE SELECTION CRITERIA.


SEQ 1          99 REP   96 STEPS/MEAS
```

Edit options are selected by typing a letter for the desired command (the letter in parenthesis), followed by a range if desired, a (SPACE) and then a (RETURN). For example L2-14 (RETURN) would list events 2 - 14. The letter H (RETURN) prints the note list out (assuming your printer was on).

To NAME the sequence, press N and a name which may consist of up to eight characters long and a (RETURN). Do not put a space after the N. If we enter NFASTRIFF (RETURN), the Sequence will be named FASTRIFF.

LIST AND EDIT

To LIST and EDIT press key L and (RETURN). The event list will be displayed to the left of the command options. A blinking cursor will be at the left side of the last event line. A simple D chord struck once and then each note played individually might look like this when listed:

	MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
	1-1	1	0	1	ON	D 4	60	9
	1-1	2	0	1	ON	D 5	68	9
	1-1	3	0	1	ON	F# 4	50	8
	1-1	4	0	1	ON	A 4	67	9
	1-38	5	37	1	ON	D 4	34	2
	1-57	6	19	1	ON	F# 4	60	10
	1-76	7	19	1	ON	A 4	64	9
	1-95	8	19	1	ON	D 5	73	7
*	2-51	9	52		DE			

The table above contains a precise description of all recorded events. Following is a definition of each item contained in the listed sequence.

MSR-ST = MEASURE-STEP: This is computed by the program and can not be changed. It shows the measure and step at which the event occurs.

EVNT = EVENT: EVNT provides you with a way to designate specific events in the sequence when you are using the various EDIT options. This also is computed by the program and can not be changed.

TIME = The time at which this event occurs in relation to the start of the previous event. Time is measured in steps of the internal clock or drumbox. Changing the current value will move this note and all subsequent notes forwards or backwards in time.

CH = MIDI channel. You may change the MIDI channel for each note individually.

TYP = TYPE of event. There are nine types of events which may be recorded. ON stands for NOTE ON. See Chapter 4 for an explanation of different types of events.

NOTE = the note value and octave. Note that the Sequencer makes no provision for flats. Specify B flat as A#.

VEL = VELOCITY. Specifies how fast the key was depressed. Various synths can use this parameter to alter filter, volume or other characteristics of the sound.

DUR = DURATION. This specifies how long the note was actually held down.

YOU CAN STOP THE LISTING before it is completed by pressing any key. Pressing another key will continue listing. To stop the listing and begin editing, hit

the LEFT ARROW KEY (top left above the CONTROL key).

Any EDIT command may be executed by entering the EDIT command letter at the start of a line. Be sure to leave a space at the end of the command, before pressing (RETURN).

You may correct or change individual values by using the ARROW or CRSR (and SHIFT CRSR) keys. To change the DURATION value in line 5, hold SHIFT and press the vertical CRSR key to move up four lines, then hold down the horizontal CRSR till the cursor reaches the value 2. When the cursor is sitting on the desired location, enter a new value. After making the desired change, press (RETURN). The numbers under MSR-ST in the following line will be erased, indicating the change has been accepted. If you LIST the sequence again, all the MSR-ST values will be updated and displayed.

SPECIFYING A RANGE

A line range may be specified for the TRANSPOSE, LIST, QUICK LIST, HARD COPY, DELETE, PLAY, COPY, and MOVE COMMANDS. Use the first letter of the desired command, followed by the start, - ,stop points, a space and (RETURN). T2-5 (RETURN), L3-19 (RETURN), D6-9 (RETURN).

If you wish to specify by measure, type M and then a command letter. The program will prompt you for beginning and end measures; and then proceed with the desired edit function.

PLAYING SEQUENCES FROM THE EDIT MODE

You may play any sequence while in the EDIT mode. To play the sequence you are currently editing, press P (RETURN). You will have now entered the PLAY FROM EDIT mode. The sequence will play one time. To play it again, press Z. When thru playing, press F1 to return to EDIT.

If you want to hear only a portion of the sequence you are currently editing, specify a range after the P command. P3-25 (RETURN).

You may play any sequence from any point by typing * (name of sequence) - (measure start). Typing *S-4 would play sequence S starting at the 4th measure. *1-20 would play sequence 1 from the 20th measure.

If you wish to hear several sequences, press P then F5 to stop the internal clock. Press the corresponding keys for any sequences you wish to hear, and then press the (SPACEBAR) to start the internal clock. If you want to hear the current sequence you are EDITING, press the Z key. Press F1 to exit the PLAY from EDIT mode.

TRANSPOSE/AUTO

Before performing any operation which will drastically change the sequence, it is wise to make a backup or copy of it for safety. Press B to make a back-up. If you make a change to the sequence you don't like, press 6 to get back the original sequence.

Let's correct the timing of the notes by pressing T (RETURN) for TRANSPOSE/AUTO. Seven options are displayed to choose from; select AUTO-CORRECT by pressing 4

and (RETURN).

Respond to the ENTER STEP COUNT promot by entering the quantization value for note separation. The auto-correction process causes all note separations (the TIME of one event start to the next event start) to be multiples of the STEP COUNT. To make all note separations multiples of an eighth-note, enter a STEP COUNT of 12 (1/8 of the measure length of 96).

If you wish to quantize the DURATION value also, enter a value for this factor. Press (RETURN) for now, which will direct the computer to make no auto-correct changes to DURATION.

The program will ask ARE YOU SURE?. Enter a Y; any response other than Y will cause the program to assume you have changed your mind and abort the current command. After a brief pause the EDIT menu will appear again. Let's lengthen the DURATION time; press T and (RETURN) again. Select option 3 TRANSPOSE DURATION. You can enter either a positive transpose factor by specifying a number or a negative transpose number by putting a minus - in front of the number. You can also make a random change with R or invert the DURATION value by entering I. Enter the value 8 for now. This will make all the values under DURATION 8 counts longer than they previously were. Answer Y again to ARE YOU SURE?

List the sequence again.

	MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
	1-1	1	0	1	ON	D 4	60	17
	1-1	2	0	1	ON	D 5	68	17
	1-1	3	0	1	ON	F# 4	50	16
	1-1	4	0	1	ON	A 4	67	16
	1-37	5	36	1	ON	D 4	34	15
	1-61	6	24	1	ON	F# 4	60	16
	1-73	7	12	1	ON	A 4	64	15
	2-1	8	24	1	ON	D 5	73	16
*	2-49	9	48		DE			

Note that the TIME values have been rounded off (quantized) to the nearest multiple of 12. In the first note list events 7 and 8 were both 19's. Now one has been rounded to 12 and the second to 24. YOU MAY NOT ALWAYS GET THE DESIRED RESULTS WHEN AUTO-CORRECTING, so it is a good idea, especially when working with long sequences which contain chords, TO MAKE A COPY OF A SEQUENCE BEFORE MODIFYING IT.

Note that the MSR-ST values have been recomputed using the values in the TIME column. We can ascertain that the STEPS/MEASURE is set to 96 by examining lines 7 and 8. Event 7 occurs at step 73 of measure 1. Event 8 which is a quarter note (value of 24) happens in the first step of measure 2.

To TRANSPOSE only a selected range of events, type T1-4 (RETURN). Don't forget the SPACE before (RETURN). From the TRANSPOSE menu select option 1, TRANSPOSE PITCH. Entering 7 as the amount results in A chord.

	MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
	1-1	1	0	1	ON	A 4	60	17
	1-1	2	0	1	ON	A 5	68	17
	1-1	3	0	1	ON	C# 4	50	16
	1-1	4	0	1	ON	E 4	67	16
	1-37	5	36	1	ON	D 4	34	15
	1-61	6	24	1	ON	F# 4	60	16
	1-73	7	12	1	ON	A 4	64	15
	2-1	8	24	1	ON	D 5	73	16
*	2-49	9	48		DE			

Press X to exit back to the EDIT menu.

COPY OR MOVE EVENTS

If you want to COPY or MOVE events, press the C or M key and specify a range. For instance if we wished to make the sequence end with a chord again, we would enter C1-4 (RETURN). In response to the INSERT AFTER prompt enter 9. Again the program will ask ARE YOU SURE? The next listing would look like:

	MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
	1-1	1	0	1	ON	A 4	60	17
	1-1	2	0	1	ON	A 5	68	17
	1-1	3	0	1	ON	C# 4	50	16
	1-1	4	0	1	ON	E 4	67	16
	1-37	5	36	1	ON	D 4	34	15
	1-61	6	24	1	ON	F# 4	60	16
	1-73	7	12	1	ON	A 4	64	15
	2-1	8	24	1	ON	D 5	73	16
	2-49	9	48		DE			
	2-49	10	0	1	ON	A 4	60	17
	2-49	11	0	1	ON	A 5	68	17
	2-49	12	0	1	ON	C# 4	50	16
*	2-49	13	0	1	ON	E 4	67	16

Notice that the last chord has a 0 TIME value and the MSR-ST are all 2-49's. The MOVE command is similar to a COPY command except that the range of events are deleted from where they originally were and moved to the new location. With a COPY command the range of events is in both the old and new location.

DELETING NOTES

You may delete notes by specifying an individual event line or a range of line numbers. D5-7 would delete events 5 - 7. The remaining notes however, would be moved forward in time, making your sequence shorter than originally recorded. If you wish to erase only a specific note or notes, and keep the remainder of the sequence intact, use the event type DE. This will keep the timing of the sequence unchanged. The effect would be as if the volume had been turned down for a specific note.

We can erase the second F# of the above sequence by changing event 6 from an 'ON' event, to a 'DE' event followed by (RETURN).

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-61	6	24	1	DE	F# 4	60	16

When you LIST again, line 6 will have no values under NOTE, VEL, and DUR. The timing of the Sequence remains the same.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	1	ON	D 4	60	17
1-1	2	0	1	ON	D 5	68	17
1-1	3	0	1	ON	F# 4	50	16
1-1	4	0	1	ON	A 4	67	16
1-37	5	36	1	ON	D 4	34	15
1-61	6	24		DE			
1-73	7	12	1	ON	A 4	64	15

EXTENDING A SEQUENCE

YOU SHOULD ALWAYS END A SEQUENCE with a DE event, IF YOU PLAN TO HAVE THE SEQUENCE LOOP OR BE CALLED UP BY ANOTHER SEQUENCE. Otherwise you will get sequences playing on top of each other incorrectly. To correct the above example, let's add one more line at the end and make it a DE event.

Type E (RETURN). The computer will display the sequence again with a blinking cursor after line number 8. Enter a DE event with a value of 24.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-73	7	12	1	ON	A 4	64	15
	8	24		DE			

List line 8 to verify that the sequence ends at the beginning of a new measure. Type L8 (RETURN). The computer should display:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
2-1	8	24		DE			

INSERTING EVENTS

To insert notes at the beginning of a sequence type I. The screen will clear and a blinking cursor will appear after EVNT 1. You must enter data in the proper format as listed above. If you do not, the message INVALID ENTRY will flash at the bottom of the screen and the cursor will display at the beginning of the incorrect data. When all data has been entered on the current line press (RETURN). The computer will process the information and then display a value under MSR-ST and start a new line.

If you change your mind about the previous line you entered, type C (CORRECT). The cursor will return to the beginning of the old line and you may change any data you wish. Change only what you need to, using the CRSR or ARROW keys to move thru data that is correct. Press (RETURN) when thru correcting.

If you wish to insert only one event and keep the remainder of the sequence as recorded, you should NOTE THE TIMING of the following notes. After you insert a note, you must SUBTRACT ITS VALUE from the following note to keep the timing of the rest of the sequence correct.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	1	ON	D 4	60	17
1-1	2	0	1	ON	D 5	68	17
1-1	3	0	1	ON	F# 4	50	16
1-1	4	0	1	ON	A 4	67	16
1-37	5	36	1	ON	D 4	34	15
1-61	6	24	1	ON	F# 4	60	16
1-73	7	12	1	ON	A 4	64	15

To insert a bass note before event 5, enter I4. The screen will clear and display the first four lines. Type in the desired data and press (RETURN). On the following line type an X to quit the INSERT mode. List the sequence again.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	1	ON	D 4	60	17
1-1	2	0	1	ON	D 5	68	17
1-1	3	0	1	ON	F# 4	50	16
1-1	4	0	1	ON	A 4	67	16
1-13	5	12	1	ON	D 3	64	16
1-49	6	36	1	ON	D 4	34	15
1-73	7	24	1	ON	F# 4	60	16
1-84	8	12	1	ON	A 4	64	15

Note that the events from line 6 on are now all 12 clock counts later. To keep the rest of the sequence relative to its previous location, we should deduct 12 counts from the time in line 6. Move the cursor up to EVNT line 6 and change the TIME value from 36 to 24. List the sequence again.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	1	ON	D 4	60	17
1-1	2	0	1	ON	D 5	68	17
1-1	3	0	1	ON	F# 4	50	16
1-1	4	0	1	ON	A 4	67	16
1-13	5	12	1	ON	D 3	64	16
1-37	6	24	1	ON	D 4	34	15
1-61	7	24	1	ON	F# 4	60	16
1-73	8	12	1	ON	A 4	64	15

The sequence is now identical to when we started except that one event has been added at line 5.

OVERDUB

The OVERDUB mode is basically the same as CREATE A NEW SEQUENCE except that the program will automatically play an existing sequence while recording the new sequence, and come out of RECORD when the end of the sequence you are overdubbing to is reached. You may then play the two sequences together and

MERGE them if you like.

When you select the OVERDUB function the computer will respond with ENTER SEQUENCE TO OVERDUB TO. This must be a sequence that is already recorded, otherwise the computer will respond with NOT ASSIGNED TO SEQUENCE KEY and return to the main menu. Next the computer will ask ENTER SEQUENCE TO STORE OVERDUB. If you enter a key that already contains data, the computer will prompt SEQUENCE USED, ERASE? Answer with a yes if you wish to record over that sequence.

Next a list of options will be displayed, where you can specify what type of events you wish to record. If you don't want to make any changes press (RETURN).

The next screen will be identical to the RECORD and PLAY screen, except as soon as you start to play the keyboard the sequence you wish to OVERDUB to will turn on. You may also turn on any other sequences you wish to hear as you record. When the end of the sequence you are overdubbing to is reached the program will switch from RECORD to PLAY and you will hear what you just recorded, along with the sequence you were overdubbing to.

You may OVERDUB a part on the same instrument that is playing back as long as you don't try to play more notes than the instrument is capable of handling.

STEP-TIME RECORD

To CREATE A SEQUENCE in STEP-TIME, select option 2. Now select ENTER IN STEP-TIME, option 2. If your synth is receiving MIDI data on a different channel than it is sending ENTER the ECHO CHANNEL, otherwise press (RETURN).

The STEP TIME ENTRY menu will be displayed. On this screen are three rows consisting of TIME (time between events), DURATION (length of time that note is held down), and VELOCITY (how quickly the note will be attacked. In each column there is one black circle. You may select one parameter in each column by selecting the corresponding key.

To create a scale of staccato quarter and eighth notes, select 9 for quarter notes, a 6 to make duration very short, and an X for a quick velocity time.

As you play each note on the synth KBD, the values currently selected on the monitor are assigned to the pitch you specify. After playing the first few notes of the scale change the time to 8th notes by pressing 6 under the TIME column.

After a few more notes move the TIME back to quarter notes and make the DURATION longer. When you've reached the end of the scale enter a half notes rest by changing the TIME to C and pressing F5 for a REST.

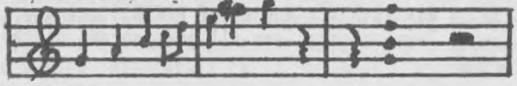
Create a chord in STEP-TIME by holding down the first note as you play additional notes. Continue to hold each note down until you've finished the chord. Then release all notes.

You may hear what you have recorded by pressing F7. To hear it again, press the Z key. You may continue recording more notes or quit.

Press F1 two times to return to the MAIN MENU.

LISTING A STEP-TIME SEQUENCE

Now select OPTION 3 - EDIT SEQUENCE. Enter the key letter or number you assigned during record in response to ENTER SEQUENCE KEY. The EDIT screen will display 25 options to choose from; select L - LIST AND EDIT. A scale in the key of 6, followed by a chord, might look like:



Listing the Sequence would reveal:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	1	ON	6 3	96	2
1-25	2	24	1	ON	A 3	96	2
1-49	3	24	1	ON	B 3	96	2
1-73	4	24	1	ON	C 4	96	2
1-85	5	12	1	ON	D 4	96	2
2-1	6	12	1	ON	E 4	96	2
2-25	7	24	1	ON	F# 4	96	23
2-49	8	24	1	ON	6 4	96	23
3-25	9	72	1	ON	6 3	96	23
3-25	10	0	1	ON	B 3	96	23
3-25	11	0	1	ON	D 4	96	23
3-25	12	0	1	ON	6 4	96	23
3-73	13	48		DE			

CONTROL SEQUENCES

Control Sequences are created using the TYPE FROM COMPUTER mode of RECORD or by EDITING an existing Sequence. Control Sequences are used to 'play' other Sequences, by specifying a SEQUENCE START EVENT.

Suppose you had recorded two sequences which consisted of a bass line, Sequence B, and a piano line, Sequence P. Now you want to Overdub a melody line. You could create a CONTROL SEQUENCE which would play both of these sequences by:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		B	0	0	1
1-1	2	0		P	0	0	1W
1-1	3	0		DE			

After you had Overdubbed your melody line (Sequence M), you could add it to this CONTROL SEQUENCE so that it would actually turn on three separate Sequences.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		B	0	0	1
1-1	2	0		M	0	0	1
1-1	3	0		P	0	0	1W
1-1	4	0		DE			

In a group of sequences being played together, make sure the last sequence of the group (with the WAIT), is equal in length or longer than the other sequences. Otherwise your sequences may start 'running together'.

It is perfectly OK to chain CONTROL SEQUENCES. That is to have one CONTROL SEQUENCE call another. Make sure to end your CONTROL SEQUENCES with a DE event.

The Sequence that is called up may have its number of REPEATS changed, and the PITCH and VELOCITY transposed. These changes are all independent of the Sequence as it was originally recorded.

The REPEAT value is placed under the DUR column.
The VELOCITY amount is placed under the VEL column.
The PITCH TRANSPOSE amount is placed under the NOTE column.

A WAIT command may also be invoked which will force the computer to finishing playing the current sequence before moving on to the next event in the sequence. The WAIT command is used by placing a W after the number of REPEATS in the DUR column.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		A	0	0	1
1-1	2	0		B	12	0	1
1-1	3	0		C	0	-20	1
1-49	4	48		D	0	0	3W
1-49	5	0		DE			

In this example Sequence A plays one time. Sequence B plays once and is transposed up one octave. Sequence C's volume will be much softer (-20 in the VEL column), and Sequence D will play 3 times. The W will force the program to finish the 3 repetitions before going to the fifth event of DE.

SAVING SEQUENCES ON DISK

From the main menu press 7 - DISK FUNCTIONS. Next press 8 - SAVE ALL SEQUENCES. The computer will prompt ENTER FILE NAME: Type in an appropriate title. If you had previously saved or loaded a file, that name will be displayed. If you wish to use this same name press (RETURN). Otherwise type a new name making sure to type spaces over any old remaining letters if the previous file had a longer name.

If a file already exists on the disk with the same name the computer will ask if it should replace this file. Respond with a Y if you wish to write over the old file. Answering with anything response other than Y will return to the DISK FUNCTIONS menu.

You should now save any Sequences you may want to keep. Enter (RETURN) to get back to the main menu,

PLAY

The PLAY option will display all sequences that have been recorded. It will also allow real-time transposing of up to nine sequences simultaneously.

Load the DEMO program to see PLAY in action. Select DISK FUNCTIONS by pressing 7. and then LOAD ALL SEQUENCES - option 4. The program will prompt ENTER FILE NAME: enter the file name DEMO1. After loading the DEMO1 file, the DISK FUNCTIONS menu will appear. Press (RETURN) and then select option 1 to play.

To play DEMO1, press Sequence key C. When you are through playing DEMO1, list the various sequences to see the structure of the song. Sequence Q, R, U contains the note events while sequence C and D are control sequences. Sequence C plays Q, R, and U and then calls Sequence D transposed up a whole note. Sequence D then immediately calls Sequence C again. The piece will continue to transpose up one key each time it is repeated.

DELETING ALL SEQUENCES

When you are ready to start your own piece you should use the DELETE option from menu 2 to clear the SEQUENCER MEMORY. Since there is no global CLEAR memory command for the SEQUENCER, you may want to create an empty song if you will be regularly working on more than one piece in a session.

NOTE - some program disks may already contain the file named CLEAR; if they do not create one yourself by using the following proceedure:

To create an empty song, delete all current sequences. Check DISPLAY SEQUENCE MEMORY to be sure, there should be 12000 events left. Save this as a song (option 8 - save all sequences), and name it CLEAR. Whenever you need to CLEAR all the memory, load this piece. It would be easier to do this immediately after booting up the KCS-128 as there would be nothing in memory yet.

INITIALIZATION

Each time you load the KEYBOARD CONTROLLED SEQUENCER you may INITIALIZE the system if you wish to make changes in the way the program operates. The INITIALIZE program can define and reset any of the default values used in the program. You can specify the type of CLOCK you want to use, change the default values of step-time entry and real-time transpose, and also make general option changes. You may return to INITIALIZATION from the MAIN program at any time to make changes without losing your sequences.

SAVING INITIALIZATION PARAMETERS TO DISK

The default values you select are valid until you change them or turn off the computer. By saving your working ENVIRONMENT to disk you may retrieve these parameters for future sessions and thus avoid the INITIALIZATION process. Saving the ENVIRONMENT also retains user scales, and ranges specified for the Algorithmic edit and selection criteria.

When first loading the program, you will be asked if you want to make any initialization changes. Pressing Y will call up the following menu:

```
INITIALIZATION SECTION
OPTIONS ARE:
0.   RUN MAIN PROGRAM
1.   CLOCK FUNCTIONS
2.   STEP-TIME ENTRY FUNCTIONS
3.   REAL-TIME TRANSPOSE FUNCTIONS
4.   GENERAL OPTIONS
ENTER OPTION
```

Select an appropriate key 1 - 4 to change any default values. When through making changes, Press key 0, (RETURN), or the (SPACEBAR) to run the MAIN PROGRAM.

0. RUN MAIN PROGRAM loads and runs the KEYBOARD CONTROLLED SEQUENCER using the current default values. Make sure the DR. T PROGRAM disk is in the drive.

1. CLOCK FUNCTIONS displays seven clock options and their current default values. You may change any option by selecting the appropriate number. The CLOCK FUNCTIONS screen looks like:

```
CURRENT CLOCK OPTIONS:
1.  SENDING MIDI CLOCK
2.  NOT TOGGLING START/STOP
3.  1  CLOCKS PER STEP
4.  METRONOME EVERY 24 STEPS
5.  24 STEPS PER QUARTER NOTE
6.  PITCH BEND ON CHANNEL 16 TO SET CLOCK RATE: OFF
7.  WAIT FOR CLOCK AFTER SONG POINTER: OFF
CHANGE:
```

Note that the Sequencer defaults to using the computer's INTERNAL clock. Use the CHANGE CLOCK option in the main program to select the EXTERNAL clock.

1. SENDING MIDI CLOCK toggles between sending or not sending one MIDI clock for each step of the clock (internal or external) that is controlling the Sequencer. This allows MIDI drum machines or synths (which have sequences programed into their own memory), to play in time with the KEYBOARD CONTROLLED SEQUENCER. MIDI clock events may also be sent from within a specific sequence (using a * event - see USEFUL MIDI COMMANDS - CHAPTER 7).

2. NOT TOGGLING START/STOP (for Passport and Syntech interfaces) toggles between leaving the START/STOP line high while the sequence is running or sending a pulse on the START/STOP line whenever the INTERNAL CLOCK starts or stops. The PASSPORT interface only accepts an external clock from MIDI. It will output a pulse clock, and also a START/STOP signal.

The default condition is that the start line is turned high when the INTERNAL clock is started, and turned low when the INTERNAL clock is stopped. This is required to run Roland and Korg Drum machines where the clock is continuously running and a separate START/STOP is needed to activate the machine. See CHAPTER 7 for more information.

3. 1 CLOCKS PER STEP allows you to sync with drum machines having other than 24 steps/quarter note (PULSE SYNC IN or OUT). The default value is 1 clock per step. This option can be used if you need a lower internal clockrate than allowed by the program.

If your drum machine produces 48 steps/quarter note, then EITHER set the external clocks/step to 2 OR set steps/measure to 192 (the Change Clock option, MENU 2 of main program).

With a 96 steps/quarter clock, EITHER set clocks/step to 4 OR change clocks/steps to 2 AND steps/measure to 192. You can gain extra resolution in the Sequencer by setting the steps/measure to 192 and NOT changing the clocks/step. The program will then respond as if every drumbox measure is actually two measures.

With the Passport interface, this option enables the program to generate one Sequencer step for any selected number of INTERNAL CLOCK steps. The Passport Interface generates one pulse clock out for every two INTERNAL CLOCK steps. By generating only one Sequencer step for every two INTERNAL CLOCK steps, you can sync your sequences with a drum machine driven by the external clock. See the Chapter on TROUBLE SHOOTING for more details.

4. METRONOME EVERY 24 STEPS changes the metronome rate. During RECORD and OVERDUB a visual metronome appears in the lower right hand corner of the screen and an audio click is sent to the monitor from the computer's audio/video connector. A value of 24 produces a pulse every 1/4 note, while a value of 12 produces a pulse every 1/8 note.

5. 24 STEPS PER QUARTER NOTE selects the number of steps per quarter note. This number is used to convert the internal clock rate of the program to BEATS PER MINUTE for screen display, and to convert BEATS PER MINUTE clock entries into the internal clock rate. (One beat is one quarter note). The program defaults to 24 STEPS PER QUARTER NOTE, and 96 STEPS PER MEASURE. If you are using a time signature other than 4/4 you will want to change the STEPS/MEASURE (Change clock option, menu 2). If you want to sync a drum machine that uses a

clock other than 24 steps/quarter note to the program's clock, change STEPS PER QUARTER NOTE to match that of the drum machine.

Increasing STEPS PER QUARTER NOTE will increase the program's clock rate for any given tempo in beats/minute. This will provide more precise recording and control of the timing of MIDI events. At a clock of 120 beats/minute, a setting of 24 will cause clock steps to be 20 milliseconds apart, while a setting of 48 will cause the separation to be 10ms. If you are not doing drum patterns from the sequencer itself, you will probably need to rewrite them if you want to take advantage of this feature.

6. PITCH BEND ON CHANNEL 16 TO SET CLOCK RATE: OFF. The C64 KCS allows you to use pitch bends on channel 16 to change the internal clock rate. The C128 program has a much more flexible system, so this feature is not normally needed. We suggest using this option only if you are using C64 sequence files that have pitchbend information on channel 16.

7. WAIT FOR CLOCK AFTER SONG POINTER: OFF. Some devices that send MIDI SONG POINTER will expect the program to treat the MIDI START or CONTINUE message sent after the pointer as the first MIDI clock, while others will not. If option 7 is OFF, the program will treat the MIDI START or CONTINUE as BOTH a START command and a clock.

Upon completing any desired changes. press (RETURN) to exit back to the INITIALIZATION menu.

2. STEP-TIME ENTRY FUNCTIONS

With STEP-TIME ENTRY you can enter music using the computer KBD to specify timing and the synth KBD to specify note values. Dynamics (velocity) may be specified by either KBD. In STEP-TIME ENTRY there are 15 values for time specification, 15 values for duration and 6 values for velocity. Any of these default values may be changed by the user except for the Z velocity key which specifies velocity received from the synth KBD.

When the STEP-TIME ENTRY FUNCTION is selected, the computer will guide you thru the process of changing default values. Select the key you wish to change, enter a value (1 - 127) and (RETURN). A second (RETURN) or (SPACE BAR) returns to the INITIALIZATION menu.

Note that the standard default TIME factors correspond to the most commonly used note values, including triplets and dotted notes, while DURATION factors are 1 count shorter than the corresponding TIME factors.

To AVOID NOTES GLITCHING, you should keep the DURATION value at least 1 count shorter than the TIME, when a note is repeated, or the sequence is being played monophonically. If the same note is to be turned off and on in the same time step, the program may turn the new note on before it shuts the old note off. This can result in undesirable and sometimes unpredictable effects on some synthesizers.

3. REAL-TIME TRANSPOSE FUNCTIONS

There are 11 real-time transpose keys which can control up to nine consecutive Sequence Keys during PLAY. All 11 of these keys may be re-assigned new transpose types and amounts. Select the key you wish to change by using the number on the real-time menu, and then specify transpose type (P)itch, (V)elocity or (D)uration and transpose amount (0 - 63).

Option 12 and option 13 work together. Option 12 will control the rate at which you 'move' the RANGE of sequences that are affected by the TRANSPOSE functions. Option 13 will determine how many sequence keys (1 - 9) are affected by the TRANSPOSE functions.

For example, if you entered a 3 for option 13 then only 3 sequence keys would be transposed. This would be displayed near the bottom of the PLAY screen as:

REAL-TIME SEQUENCES:123

Leaving option 12 default value at 1 would cause the LEFT-ARROW key when pressed during the PLAY mode to shift the range down by one. The display would show:

REAL-TIME SEQUENCES:Z12

The range will 'wrap around.' Pressing the 0 key 3 times would change the display to:

REAL-TIME SEQUENCES:345

Thus Sequence keys 3 - 5 would be affected by any transpose keys that were pressed.

If you set Option 12 (Sequence RANGE) to 5 and Option 13 (NUMBER of Sequences) to 6 and then enter the PLAY mode the display would read:

REAL-TIME SEQUENCES:123456

Pressing 0 (shift to right) would alter the display to read:

REAL-TIME SEQUENCES:6789AB

Only the Sequence Keys selected by option 13 are affected by the TRANSPOSE keys. The initial default value is Sequence 1 and 2. These transposes are temporary, they will have no effect on subsequent playing of the sequences. For the TRANSPOSE feature to work, at least one of the sequences (specified by option 13) must be PLAYING or WAITING when a transpose key is pressed.

Option 14 turns off the TRANSPOSE display. This prevents the program from erasing the sequence names and repeat factors once PLAY has been activated. Entering 14 again will toggle this option on and off. All TRANSPOSE functions still work. UNTIL YOU ARE READY TO USE REAL-TIME TRANSPOSE, YOU SHOULD LEAVE THE TRANSPOSE DISPLAY OFF TO AVOID CONFUSION.

4. GENERAL OPTIONS

Selecting option 4 on the INITIALIZATION menu brings up a following screen:

```
GENERAL OPTIONS:
1. ARE YOU SURE QUERY: ON
2. AUTOMATIC CONTROL SEQUENCE UPDATE: OFF
3. MIDI SLOW: 0
4. COMMENT LINES ON PLAY SCREEN: 5
CHANGE:
```

1. ARE YOU SURE QUERY toggles the ARE YOU SURE QUERY on and off. If you DO NOT want the program to ask ARE YOU SURE? every time you do a transpose, copy, merge or similar operation, toggle the ARE YOU SURE query OFF.

2. AUTOMATIC CONTROL SEQUENCE UPDATE. If initialized to ON, this feature, after RECORD or OVERDUB will ask DO YOU WANT TO CREATE OR ADD TO CONTROL SEQUENCE? Answering Y will then ask you to enter the key or number of the control sequence desired. Use this feature to build up a control sequence to call all parts as they are created.

3. MIDI SLOW: Some instruments cannot accept MIDI data at the baud rate sent by a C64 or C128. Use this option when using DX7's, TX modules, or any synth that has missed or stuck notes. The MIDI SLOW feature allows you to slow down MIDI transmission to these instruments.

When selecting option 3, the program will prompt ENTER VALUE FOR MIDI SLOWDOWN (60-255 OR 0 FOR OFF)? The larger the value entered the more data transmission will be slowed. Use the smallest value for which your instruments function properly.

Some users have had problems with MIDIfied Drumulators (the instrument would miss playing some notes). You could try using the MIDI SLOW feature. Start with a value of 60. If you are still encountering problems, raise the MIDI SLOW #.

COMMENT LINES ON PLAY SCREEN: You can set the number of comment lines that will appear on the bottom of the play screen from 0-10 (the default is 5). Each line takes up space that could be used for four SECONDARY sequences, however. The comment lines may be viewed and edited from the EDIT TEXT option on MENU 2.

MAIN MENU - OPTION DESCRIPTIONS

The MAIN MENU contains the following options:

1. PLAY
2. RECORD
3. EDIT
4. COPY/APPEND
5. MERGE
6. OVERDUB
7. DISK FUNCTIONS
8. OTHER OPTIONS

1. PLAY

PLAY is selected by pressing 1 or P (PLAY) on the keyboard. A new screen displays all Sequences thus far recorded. You may PLAY all Sequences in real-time. You can also transpose the pitch, velocity, and duration of any Sequences (defined during the INITIALIZATION process) in real-time.

The play screen has been organized to take full advantage of the 80 column screen, and to display as much of the data in the 128 program as possible. An example of the play screen might look like the following:

```
S RE NAME     P F W S RE NAME     P F W S RE NAME     P F W S RE NAME     P F W
- -- -------- - - - - -- -------- - - - - -- -------- - - - - -- -------- - - -
1 99 INTRO         .2 99 VERSE         .3 99 CHORUS        .4 99 BREAK
                   .                   .                   .
9 99 IBASS         .A 99 VBASS         .B 99 CBASS         .C 99 BBASS
D 99 IBELLS        .E 99 VPIANO        .F 99 CPIANO        .6 99 BHORNS
H 99 IRIFF         .I 99 VTRUMPET      .J 99 CBRASS        .K 99 ORCHITS
                   .                   .                   .
P 99 IDRUMS        .0 99 VKICK         .R 99 CKICK         .S  1 SONG
T 99 RIDE 1        .U 99 VSNARE        .V 99 CSNARE        .W  1 ALTSONG
X  1 PRESETS       .Y 99               .Z  1 U             .01   HATS
                   .                   .                   .
06   BCLAPS        .07   6TRSOLO1      .08   6TRRIFF       .09   SNAREHIT
10   CRASH         .11   TOMROLL1      .12   TOMROLL2      .13   WHISTLE
14   HATS2         .15   VPERC         .16   CPERC         .17   BPERC
18   CLAPS1        .19   CLAPS2        .20   CLAPS3        .
22   MUTEKICK      .23   MUTESNAR      .24   MUTEBASS      .
                   .                   .                   .
--------------------------------------------------------------------------------
HITSONG
1 = DRUMS          2 = HORNS           3 = BELLS           4 = GUITAR
5 = BASS           6 = PIANO           7 = ORCHITS
EXT TEMPO = 118

CLOCK:   123 BEATS/MINUTE   MEASURE            RT SEQS 12          F1 TO EXIT
```

The play screen contains three sections, the sequence section, the text section and the status section. The naming of sequences and order of recording them is completely arbitrary. You may find it helpful to use codes in naming sequences or assigning sequences to specific keys to make a song more decipherable. For instance, place all chorus parts in the third column, all bridge parts in the

fouth column. etc.

SEQUENCE SECTION

Four sequences are displayed on each line, with vertical lines of dots separating the sequences. Any recorded sequences will have data under the S and RE columns. Initially, when the screen comes up, nothing appears under the P F W headings. If a NAME has been assigned during EDIT, the program default is to keep the sequence names, and not show real-time transposes. This can be changed in the INITIALIZATION SECTION of the program. The number of programmed repeats is not shown for secondary sequences.

The meanings of the data displayed under the different headings are given below:

S = Sequence key (1 - 9), (A - Z), or (01 - 92). Only RECORDED Sequence keys will be displayed.

RE = the number of times a sequence will REPEAT when played from computer KBD. A value of 99 indicates sequence will play indefinitely. Use the EDIT mode to change the RE value.

NAME = the NAME given to a Sequence during EDITING. NAME can be set to be erased and replaced with REAL-TIME TRANSPOSES values when sequence is played. See INITIALIZATION - Chapter 3.

The P, F, and W columns remain blank, unless the sequence is currently playing.

P = the number of plays remaining (1 - 8).
1 indicates the sequence is in it last cycle.
9 indicates the sequence has 9 or more plays left.

F = FROM where a Sequence is being called. The value displayed represents the Control Sequence.
Remains BLANK if called by COMPUTER KBD.

W = W indicates the Sequence has encountered a WAIT command.

M = M (in W column) indicates this Sequence has been MUTED.
when W column is blank, this indicates sequence is not WAITING or MUTED.

Once we begin playing the song (pressing key S), numbers and letters will appear in the P, F, and W columns.

TEXT SECTION

The text section displays data entered from the EDIT TEXT option. You can enter up to ten lines of desciptive text and store them along with sequence data. The top line of text is initialized to dashes for visual separation (which you may change). You can use the initialization section of the program to change the number of lines of text displayed on the play screen from the default of 5 to any value from 0 to 10.

STATUS LINES

```
CLOCK:   123 BEATS/MINUTE   MEASURE        PAUSE   RT SEQS 12        F1 TO EXIT
COUNTIN      RECORD         ECHO           CUE       ALIGN          MIDI THRU
```

The bottom two lines of the play screen display are used to show the status of various sequencer functions. Most of the functions will not be displayed except for when they are actually being used.

CLOCK: will will display which clock type is currently in use. Either external clock, or the current clock rate in beats/minute if the internal clock is being used.
The clock rate can be changed during play by using:

- the , key to INCREASE the clock rate.
the . key to DECREASE the clock rate.

The displayed rate will not, however, exceed 255 beats/minute even if the actual clock rate is greater than 255. The C128 KCS allows you to enter the number of steps per quarter note (beat), and uses this figure for the bpm computation. The rate displayed will thus be correct even if you have changed the number of steps/measure to reflect a time signature other than 4/4.

MEASURE displays the current measure being played.

PAUSE - The ESC key can be used as a 'PAUSE button' during playback or record. Pressing ESC causes all notes currently on to be turned off, and causes the program to ignore all clocks until the pause button is pressed again. The word PAUSE is displayed on the bottom status line while play is paused. Pause may be used during record as well as play.

RT SEQS - (REAL-TIME SEQUENCE TRANSPOSE) shows which sequence keys are currently affected by real-time transposes. REAL TIME TRANSPOSE can only be applied directly to primary sequences. Primary sequences will pass real-time transposes on to any secondary sequences that they start. Real-time transpose amounts will NOT be shown on the screen unless they are enabled from the INITIALIZATION SECTION of the program.

COUNTIN is displayed only during the countin period of a record or overdub. COUNTIN time is set from the OTHER OPTIONS menu.

RECORD will be displayed only while the sequencer actually recording.

ECHO and the selected echo channel will be displayed if the echo option was selected during the current record.

CUE will be displayed if the record with cue option was selected for the current record.

ALIGN is displayed when the align feature is active (by pressing F3).

MIDI THRU is displayed during play if the MIDI THRU feature on the second menu was been enabled. MIDI THRU merges all incoming MIDI data, of all types EXCEPT system exclusive, with the data output by the sequencer. Note that if you are

recording with an echo channel, the MIDI THRU feature will NOT OPERATE during the time that the sequencer is actually recording. Only events of the types being recorded will be passed through, and they will be rechannelized to the selected MIDI channel. MIDI THRU will work again once the sequencer goes to playback mode.

MIDI THRU only OPERATES while the program is in play or record mode.

METRONOME - The right corner of the bottom line is reserved for a visual metronome (a blinking square). An audio metronome is also sent to the monitor. If your monitor has no speaker, you can patch the RCA plug (part of the Commodore video adapter cable) to an audio input on your mixing board.

TO PLAY A SEQUENCE (starting PRIMARY sequences)

Press the corresponding Sequence key on the computer keyboard. If you are using an EXTERNAL CLOCK (non-MIDI drumbox), the Sequence will begin playing as soon as the drum machine is started. If you are using a MIDI drumbox, the sequence and the drum machine will immediately start when you press a sequence key. As the Sequence plays through its loops, the value under R (REPEAT factor) if set to a number other than 99 will be decreased by 1 until it reaches "1", after which it will shut off. Note the display will not change until there are 9 or less repeats to play.

Any number of Sequences may be played at one time, and several Sequences may be sent to the same instrument. If you attempt to send more voices to an instrument than are available, not all voices will play. The results will depend on the design of the particular instrument you are using.

STARTING SECONDARY SEQUENCES

You can start a secondary sequence (from PLAY) by pressing the LINE FEED key, followed by the two digits of the sequence number. You may press and release each key, you do not have to hold one down while pressing another. Press LINE FEED followed by 0 and 2 to start sequence 02 or LINE FEED followed by 5 and 4 to start sequence 54. The sequence will play for its programmed number of repeats. Retriggering the sequence will cause it to finish the current cycle and end. Retriggering a secondary sequence key while in its last cycle will cause it to end immediately.

CONTROLLING THE REPEAT FACTOR

During PLAY, you can defeat the number of REPEATS for a Sequence by pressing its represented key. The number of REPEATS will be set to 1 and then play for one final cycle. If the Sequence is already in it's last cycle, it will immediately shut off.

To SHUT OFF A SEQUENCE that has 2 or more REPEATS, press its key twice.

USING TAB KEY TO REPLAY CUE

Press the TAB key to replay the last cue sequence used in RECORD WITH CUEING or PLAY FROM CUE. Both of these functions share the same data area, so the last cue played will be from the most recently used of these functions.

MOVING THE CUE POINT

You can move the CUE POINT forward or backward while in the play mode.

the < key moves the CUE POINT 2 measures backwards
the > key moves the CUE POINT 2 measures forwards
note - press SHIFT and , or . to type < or >

holding down SHIFT and SPACE BAR at the same time and then pressing < or > moves the CUE POINT 8 measures
press SHIFT and SPACE BAR again to change back to 2 bar moves

CHANGING THE CUE SEQUENCE

Pressing F6 during PLAY moves the currently defined CUE SEQUENCE one key towards the beginning of the PRIMARY SEQUENCES (1 - 9, A - X).

Pressing F8 moves the currently defined CUE SEQUENCE one key towards the end of the PRIMARY SEQUENCES. (press SHIFT F5 or SHIFT F7 to get F6 or F8).

By keeping alternate arrangements of your songs on consecutive sequence keys, you can quickly go back and forth between the same point of different arrangements of a piece.

MUTE AND UNMUTE

To MUTE a sequence, press SHIFT and the Sequence key simultaneously. An M will appear under the M heading for the Sequence. The Sequence will continue to step in time, but no events will be sounded. Notes currently playing will be shut off unless they were defined with DURATION 0 and separate NOTE OFF events. These notes will be stuck on and will have to be reset locally on the instrument.

To UNMUTE a Sequence, press the Sequence key again (no SHIFT) this time. The M will disappear and the Sequence will resume sounding at the same point it would have been at, had the MUTE feature not been invoked. Use MUTE to cue in and out multiple overdubs in real-time, or to isolate and listen to individual tracks.

REAL-TIME TRANSPOSE

Near the bottom of the Screen appears the phrase:

RT SEQ:12

These are the SEQUENCE KEYS WHICH MAY BE TRANSPOSED IN REAL TIME as the SEQUENCER plays. Initially there will be two Sequences 1 & 2, unless the default values of the REAL-TIME TRANSPOSE FUNCTIONS were changed during INITIALIZATION.

Use the LEFT ARROW and 0 keys to change which Sequence keys will be affected by the REAL-TIME TRANSPOSE. The LEFT ARROW (upper left of KBD) will lower the range and the 0 key will raise the range. The new set of keys will be displayed next to RT SEQS: From INITIALIZATION, you may change the amount of range for the LEFT ARROW and 0 keys.

REAL-TIME TRANSPOSE DEFAULT VALUES

KEY	TRANSPOSES	AMOUNT
+	PITCH	1 half-steps
-	PITCH	2 half-steps
LB	PITCH	4 half-steps
C(CLRHOME)	PITCH	7 half-steps
I(INSTDEL)	PITCH	12 half-steps
@	VELOCITY	6 units
*	VELOCITY	12 units
UPARROW	VELOCITY	24 units
(RETURN)	DURATION	1 unit
CRSR U/D	DURATION	3 units
CRSR L/R	DURATION	6 units

Pressing the desired TRANSPOSE key will transpose the current Sequence up by the above specified amount. (SHIFT) TRANSPOSE key will transpose the corresponding value down.

(SHIFT) F1, F2, and F3 reset PITCH, VELOCITY and DURATION TRANSPOSES to 0.

REAL-TIME TRANSPOSES are added to any transpose assigned to the Sequence through a CONTROL event.

Normally the real-time transpose value is not displayed. Use the REAL-TIME OPTIONS of the INITIALIZATION section which will erase the NAME of a sequence and replace it with the current transpose value.

FUNCTION KEYS IN PLAY

The FUNCTION keys work differently in various modes of the Sequencer. See FUNCTION KEYS (in Index) for a full description.

F1 EXITS to the MAIN MENU, shutting off all notes before leaving the PLAY mode.

(SHIFT) F1 resets any real-time PITCH transposes set-up during PLAY.

F3 ALIGNS Sequences called from the computer keyboard to start at the beginning of the next measure. The start of the next measure is computed by counting steps from the start of the first Sequence played, and assumes that the number of steps in a measure is the value set using menu option M. The word ALIGN will appear on the STATUS line.

(SHIFT) F3 resets any VELOCITY transposes set-up during Play.

F5 CANCELS all active sequences. TURN OFF THE DRUMBOX FIRST then the F5 key if you wish to restart your sequences in sync. If you did press F5 before stopping the drum machine, press F5 again.

F5 also shuts off the INTERNAL CLOCK. You must press the SPACEBAR to restart the clock after pressing F5. Use this method to start several Sequences at once.

If sequences were created using separate NOTE ON and OFF events (DURATION 0) and you use F1 or F5 after a NOTE ON event but before the corresponding NOTE OFF event, the note will be 'stuck' on. You must locally reset the instrument by pressing a new Program.

F6 moves the currently defined CUE SEQUENCE one key back, to the beginning of the PRIMARY SEQUENCES (1 - 9, A - X). Press SHIFT and F5 to get F6.

F7 and the FOOTSWITCH shut off any multiple repeats that are set up for Sequences 1 - 9. Use this to exit from a vamp section. When activated, the current REPEATING Sequences will be put into a last cycle, play thru one more time, and then shut off. The P field (times left to PLAY) will not change immediately.

F8 moves the currently defined CUE SEQUENCE one key towards the end of the currently defined CUE SEQUENCE. Press SHIFT and F7 to get F8.

STARTING SEVERAL SEQUENCES SIMULTANEOUSLY

When using the INTERNAL CLOCK, timing starts when you press a Sequence key. To start several Sequences using the INTERNAL CLOCK, press F5, which will stop the clock, then one or more Sequence keys. Then the SPACE BAR to start the clock. A drumbox which accepts MIDI clocks will also be started when you hit the SPACE BAR.

If a drum machine is providing the EXTERNAL CLOCK, press F5 to clear the computer, enter the Sequence keys and then turn on the drum machine.

2. RECORD

When RECORD is selected the computer will respond with ENTER SEQUENCE KEY OR NUMBER: Press one key (1 - 9) or (A - X) for a PRIMARY sequence or two keys (00-92) for a SECONDARY sequence. Pressing F1 or 0 will abort the Recording process and bring you back to the main menu. If you have previously recorded on a specified Sequence, the computer will prompt, SEQUENCE USED, ERASE? Y will signify yes and any other key will bring you back to the MAIN MENU.

There are 35 PRIMARY sequences (1 - 9 and A - Z) and 93 SECONDARY sequences (00 - 92). The basic difference between the two is that only PRIMARY sequences can be real-time transposed and have their repeat number changed during PLAY. Both sequences can be called from another sequence, but calls to Secondary sequences must use the ST command (see SEQUENCE START EVENTS).

The Y and Z keys are used by the program. The Y key is used during EDIT as a BACKUP sequence. You may edit and copy the Y key, but be aware its contents will be changed when you use the BACKUP command.

The Z key is set aside by the computer as a temporary ALTERNATE KEY ASSIGNMENT.

After you have selected a Sequence key, the following screen will appear.

```
NEW SEQUENCE OPTIONS
1.   RECORD IN REAL-TIME
2.   ENTER IN STEP-TIME
3.   TYPE FROM COMPUTER
4.   RECORD WITH CUEING
ENTER OPTION:
```

Select option 1 - 4 or press (RETURN) or the (SPACEBAR) to default to option 1.

RECORD IN REAL-TIME records events from your synthesizer keyboard. In this mode the program is similar to a tape recorder, recording all notes as you play.

ENTER IN STEP-TIME creates a Sequence using a method similar to step-time entry on a drum machine. You specify the time between events and note duration from the computer KBD and the pitch value from the synth KBD. Velocity may be specified from either KBD.

TYPE FROM COMPUTER creates an event list containing all Sequence parameters including note on and off values, duration, velocity, program and control changes. You can also use TYPE FROM COMPUTER to build a CONTROL SEQUENCE which calls up already recorded Sequences in a desired order. This procedure is similar to the CHAIN or BUILD SONG mode on a drum machine.

RECORD WITH CUEING is very useful when you want to record a part which is an overdub to another sequence or when a sequence may start with a long period of silence and you don't want to wait to get to the desired point. When RECORD WITH CUEING is selected, you will be asked to specify a sequence key to cue to, and then a measure to begin recording at. Select a couple of measures ahead of where you actually want to play so you can get the time. If the CUE sequence you specify is a control sequence, all the sequences that it calls will begin playing from the measure you specified.

When the RECORD screen is displayed, press F7 to start the process. The CUE sequence will begin playing and recording will begin. When you are through recording press F7 again. The program will jump back to your specified measure and play back the cue sequence and the sequence that you recorded. If you wish to record again, press F5 and repeat the process. When you are satisfied with what you have recorded press F1 to exit back to the Main Menu.

RECORDING WITH CUEING is a very fast and easy way to add short parts to a long sequence; say adding a tom fill to the end of a verse, or adding a grace note to an already recorded sequence, or fixing a one measure section in an otherwise perfect sequence, etc.

When using RECORD WITH CUEING with AUTOMATIC SEQUENCE UPDATE (set from INITIALIZATION), you can 'build' a song very quickly. See ADVANCED USER for more information.

When RECORDING a new sequence, the REPEAT count is automatically set to 99. It may be changed during EDIT.

REAL-TIME RECORD OPTIONS

Selecting REAL-TIME RECORD brings up a list of 6 more options. Each option is followed by a 0 to signify OFF or a 1 to signify ON. These options and their normal default values are:

1	COMPUTER	0	Record Sequence events from computer KBD.
2	MIDI	1	Record MIDI keynote events.
3	NON-KEYBOARD	0	Record other MIDI events, such as pitchbend, control changes, & program changes.
4	AFTER-TOUCH	0	Record after-touch events (pressure).
5	NOTES OFF	0	Store note off events separately from note on events.
6	ECHO CHANNEL	0	Echo all selected MIDI events to another MIDI channel.

The first five options may be toggled ON/OFF by selecting the appropriate option number and (RETURN). To change the ECHO CHANNEL, select 6, (RETURN) and then a number from (1 - 16). Enter 0 to toggle ECHO CHANNEL off.

DEFINITION OF REAL-TIME RECORD OPTIONS

1. COMPUTER - The Computer reads its own keyboard and records all keys depressed. Any key depressed which has been assigned to a previously recorded Sequence will begin playing that Sequence immediately. You can activate primary sequences, or real-time transposes by pressing the appropriate key. Use this option to create a CONTROL SEQUENCE in real-time. The program will record these as KY events rather than ST events; refer to table of C128 ASCII codes.

2. MIDI - Records MIDI Note on and Note off keyboard events. Normally you would leave this on unless you want to record only computer events.

3. NON-KEYBOARD - Records MIDI control events such as Program Changes, Mod Wheel Changes, Pitchbend, and Footpedal. Note that MIDI OPTION #2 MUST BE ON. RECORDING PITCHBEND & MOD WHEEL CHANGES USES UP MEMORY VERY QUICKLY.

4. AFTER-TOUCH - Records MIDI control events of After-touch or Pressure. This control is treated separately from option 3 because it is almost impossible to play a DX7 without sending some After-touch events. Recording After-touch uses up computer memory VERY FAST. Option 4 is only functional if Option 3 has been selected. NOTE that if Option 4 is off, control changes for parameter 3 on MIDI channel 1 (After-touch events on early DX7s) will also not be recorded.

5. NOTES OFF - Allows separate storage of Note off events. For optimum performance the SEQUENCER program was designed to play up to 32 notes simultaneously. If you need more notes, you must record these particular notes as separate NOTE ON and NOTE OFF events. If you want to record NOTE OFF VELOCITY, use this option.

6. ECHO CHANNEL - All MIDI events being recorded will be converted to and transmitted on the currently selected ECHO CHANNEL. This allows you to record with a remote keyboard in the Local Control Off mode, and hear what you are playing on any synthesizer connected to the Sequencer output. Note that not all synths can function in a Local Control Off mode, however and the ECHO CHANNEL

feature works only while you are actually in the RECORD mode.

REAL TIME RECORDING

When you are finished selecting the desired options press (RETURN). The PLAY screen will now be displayed. All previously defined Sequences may be played, exactly as described under the PLAY option Recording will begin when you start playing the KBD or press F7 and the (SPACE BAR) to record silence first.

ALIGN

The ALIGN feature, activated by pressing F3 before you begin recording, will assure that your Sequence is a whole number of measures long. The word ALIGN will appear at the bottom of the screen and when you stop recording, the program will not actually stop recording until end of the current measure is completed.

Shut off the ALIGN feature by pressing F3 again. ALIGN is very useful because it keeps your sequences in time, but unlike the AUTO-CORRECT function it leaves the subtle timing variations played within the sequence, intact.

If you do not wish to use ALIGN, you can correct the ending point of your sequence with EDIT or you can record an empty sequence of the proper length and OVERDUB to it.

USING THE INTERNAL CLOCK

The INTERNAL CLOCK starts running when you begin RECORDING. A MIDI drum machine may be started when you begin RECORDING (play the KBD or press the SPACEBAR), provided you have left the MIDI CLOCK on in the INITIALIZATION section of the program. See Chapter 5 - page 76 on how to record internal clock changes.

F5 ERASES the current sequence, shuts off the INTERNAL CLOCK, and resets the program to re-record the current sequence. You must press the (SPACEBAR) to turn on the INTERNAL CLOCK before you may record again.

TO RECORD IN SYNC with a MIDI drumbox program, hit F5 after you enter the RECORD mode. Hit F7 to start Sequence RECORDING and THEN hit the (SPACE BAR) to start the clock. The drum part will start playing and the delay between hitting the (SPACE BAR) and the first note played will be recorded as part of the Sequence.

USING THE EXTERNAL CLOCK

If you are using a drumbox to provide the clock, RECORDING WILL BEGIN WHEN THE DRUMBOX HAS BEEN STARTED and one of the following events occurs:

MIDI NOTE ON events
MIDI non KBD events (if the proper PB, CC, or AT option has been selected)
Any Sequence key on computer KBD has been activated
Hitting the FOOTSWITCH or F7 key

MIDI drum machines can be started by the program even if they are providing the clock. The program puts out a MIDI START command as soon as one of the above events has occurred.

When using an EXTERNAL CLOCK and a non MIDI drumbox, sequence data can be recorded before the drum box is started. On playback, all these notes will be 'spewed' out as one event, because the computer has recorded them all with a time duration of 0 events. To avoid this, clear the record memory by pressing F5 and then turn on the drum machine.

To start a Sequence with a REST, use the FOOTSWITCH or F7 key.

To start in SYNC with a drumbox program, press F7 BEFORE starting the drumbox. To RECORD a part in SYNC to a previously recorded Sequence, hit F5 to CANCEL and reset any Sequences, then select the desired Sequence keys you wish to play along with before starting the drumbox. You may later edit out any timing errors at the beginning of the Sequence, or, indeed any errors of any type.

TO STOP RECORDING, press F1, F7, or the FOOTSWITCH.

SUMMARY OF FUNCTION KEYS IN REAL-TIME RECORD

F1 causes the Sequencer to stop RECORDING immediately and return to the MAIN MENU.

F3 ALIGNS the Sequence, causing the program to wait until the final measure has completed before ending the recording process (you must use the F7 key). The word ALIGN will appear on the STATUS LINE.

F5 stops RECORDING, Sends a MIDI STOP event (even if the MIDI CLOCK is shut off), ERASES the current Sequence, and resets the program to RECORD the current Sequence again. Use F5 to maintain sync with a non-MIDI drumbox after turning the drum machine.

F7 or the FOOTSWITCH is used to start recording a sequence with silence. F7 and the FOOTSWITCH also stops RECORDING and starts playing back the newly recorded sequence and any other sequences you set to play during record. If ALIGN is on, the program will continue RECORDING until the end of the current measure. Always use F7 if you are using ALIGN.

STEP-TIME ENTRY

After selecting the ENTER IN STEP-TIME option you will be prompted with ENTER ECHO CHANNEL: Enter a value from 1 - 16 and (RETURN) to echo the MIDI data. You can default to the last MIDI value entered by pressing (RETURN) only.

The STEP-TIME MENU displays three columns. Listed are 15 choices for TIME separation between notes, 15 choices for note DURATION, and 6 choices for VELOCITY. The Z option under VELOCITY tells the program to accept velocity data from the synthesizer KBD.

Note that the TIME values are the most frequently used values including triplets and that the DURATION values are generally 1 count shorter than the corresponding TIME value. Some instruments will not respond properly if you repeatedly play a note that has a DURATION value equal to or longer than the TIME value.

Option 2 of the INITIALIZATION menu will change any of the STEP-TIME values without losing anything currently in memory. See INITIALIZATION - CHAPTER 3.

The current values are indicated by a filled in circle to the right of each column. TIME, DURATION, and VELOCITY values may be changed by at any time by pressing the corresponding key on the computer KBD. The notes played on the synthesizer KBD, will be recorded into memory with the current values displayed on the CRT.

A TIME change is normally NOT MADE UNTIL AFTER THE NEXT EVENT. If you play two notes and then make a TIME change, on PLAYBACK, three notes will play before the TIME changes.

Use F3 - RESET TIME to FORCE THE TIME CHANGE TO OCCUR ON THE NEXT NOTE. Enter notes at the first TIME value, change the TIME value, press F3, and then continue to enter notes.

To insert a REST, press F5. To insert a REST of a different time value, change TIME value, press F3, then press F5.

To create a TIME VALUE that is the sum of two menu values, select one value, press F3 - RESET TIME, select the other value, and press F5 - REST.

STEP CHORDS are created by holding notes down, and not releasing until all notes of the chord have been played. The program will record the time separation between notes as zero.

The FIRST NOTE of a STEP-TIME sequence will have a time of zero unless a rest has been entered.

The end of the sequence is updated as each note is recorded, so once you are in play mode, you can loop the sequence by pressing its key. The last note of each play will overlap the first note of the next play if you do this.

While playing from STEP-TIME, the measure counter will appear lin the bottom right corner. If you change the internal clock during play, the new tempo will appear to the left of the measure counter.

FUNCTION KEYS IN STEP-TIME RECORD

The FUNCTION KEYS work slightly different during STEP-TIME recording.

F1 stops RECORDING and EXITS to the main menu.
F3 specifies that the new separation TIME applies to the next note.
Press F3 AFTER changing the TIME value.
F5 inserts a REST.
F7 PLAYS the current Sequence one time.
Use the Z key to PLAY again.
Press F1 to escape PLAY and return to STEP-TIME ENTRY.

The ESC key will play the last 8 notes of the sequence.
The TAB key will play the last 24 notes.
The LEFT ARROW key deletes the last note of the sequence. Press repeatedly to delete several notes.

TYPE FROM THE COMPUTER KBD

The TYPE FROM THE COMPUTER KBD option lets you enter event data by hand. Although it is the slowest method of recording, it does give you total precise control over every parameter of an event. You can specify when a note is to play, what MIDI channel to sound on, note pitch, velocity and duration.

You can use the the TYPE FROM COMPUTER KBD to create control sequences which call up other sequences, changes programs, or turn on modulations etc.

When you first enter TYPE FROM COMPUTER KBD, the screen will look like:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
	1	*					

You must supply values for columns 3 - 8. There are several different types of information that you can also enter, depending on what you want to do. First lets look at entering notes only.

In traditional music notation a C major scale followed by a chord looks like:

The TYPE FROM COMPUTER KBD event list would look like:

MSR-ST	EVNT	TIME	CH	TYP	NOTE		VEL	DUR
1-1	1	0	1	ON	C	4	64	11
1-13	2	12	1	ON	D	4	64	11
1-25	3	12	1	ON	E	4	64	11
1-37	4	12	1	ON	F	4	64	11
1-49	5	12	1	ON	G	4	64	11
1-61	6	12	1	ON	A	4	64	11
1-73	7	12	1	ON	B	4	64	11
1-85	8	12	1	ON	C	5	64	11
2-1	9	12	1	ON	C	3	64	24
2-1	10	0	1	ON	G	4	64	36
2-1	11	0	1	ON	E	4	64	36
2-1	12	0	1	ON	C	5	64	36
3-1	13	96		DE				

SEQ 1 99 REP 96 STEPS/MEAS

MSR-ST and EVNT are supplied by the computer. MSR-ST shows the time of an event relative to the beginning of the sequence. The value under MSR is the MEASURE in which the event occurs, and the value under ST is the STEP within the measure. A value of 1-1 indicates a note to be played immediately at the start of the sequence, a value of 2-13 indicates a note to be played at the 13th step of the second measure.

The number of steps in a measure may be altered by the CHANGE MEASURE/STEPS command (menu 2). The program is originally configured for 96 steps per measure or 24 steps per quarter note.

The value under EVNT is the number of the EVENT. You can specify a range of event numbers with most of the EDIT commands (LIST, PLAY, TRANSPOSE, COPY, etc.).

The TIME value is the number of clock steps which must elapse between the last event and the current event. Any number from 0 - 65535 is valid.

The following abbreviations may be used to simplify entry:

A - last value used	Q - Quarter note
W - Whole note	E - Eighth note
H - Half note	S - Sixteenth note

A (SHIFTED) W, H, Q, or E can be used to enter values that are 1/3 of the unshifted values. When the data line is sent by pressing (RETURN), these letters will be replaced by their numerical equivalents. A subsequent change in STEPS/MEASURE will not affect events already entered.

MSR-ST	EVNT	TIME	CH	TYP	NOTE		VEL	DUR
1-48	1	H	1	ON	C	4	80	21
1-60	2	E	1	ON	D	4	67	11

The value under CH signifies the MIDI channel on which this note is to be sent (1 - 16). Different MIDI channels may be specified in the same sequence.

MSR-ST	EVNT	TIME	CH	TYP	NOTE		VEL	DUR
1-1	1	0	4	ON	C	4	78	24
1-13	2	12	7	ON	D	4	64	31
1-25	3	12	5	ON	E	4	60	23
1-37	4	12	1	ON	F	4	45	8
1-49	5	12		DE				

If you wanted to send the same note to two different MIDI channels you would enter a 2nd note with a time of 0 and send it to another MIDI channel.

MSR-ST	EVNT	TIME	CH	TYP	NOTE		VEL	DUR
1-1	1	0	4	ON	C	4	78	24
1-1	2	0	5	ON	C	4	78	24
1-13	3	12	4	ON	D	4	64	31
1-13	4	0	5	ON	D	4	64	31
1-25	5	12	4	ON	E	4	60	23
1-25	6	0	5	ON	E	4	60	23
1-37	7	12	4	ON	F	4	45	8
1-37	8	0	5	ON	F	4	45	8
1-49	9	12		DE				

TYP = TYPE of event. There are twelve TYPES of events that may be recorded with the C128 KCS. Seven of these are MIDI events and five are non-MIDI. A Sequence may contain different types of events. Not all synthesizers will respond to all of these events. The seven MIDI events that THE KEYBOARD CONTROLLED SEQUENCER recognizes are:

ON - note on
OF - note off (may be also be typed as OFF)
P6 - program change
CC - control change
AT - after-touch or channel pressure
PB - pitch-bend
* - Single byte event

The five types of non-MIDI events are:

any PRIMARY Sequence key - Sequence Start Event
(1 - 9 or A - Z)
ST - Secondary sequence start events (00 - 92)
will also work with any PRIMARY sequence
XX - Sequence stop events
KY - Key press events
DE - Deleted event or rest

VALUES FOR NOTE, VELOCITY and DURATION

The meanings of the VALUES entered under the NOTE, VELOCITY, and DURATION columns depend on which of the twelve events is under the TYP column.

NOTE ON AND OFF If the TYP is ON or OFF, the NOTE value will be a note from A - 6 followed by a number representing the octave. The MIDI keyboard covers over ten octaves, from C-1 to 69. Some instruments may not respond to this whole range. C4 would represent middle C (the third C on a DX7 or Six-trak). Use a # to denote raised notes. C5, D3 and 6#4 are valid entries.

The value under VEL is the VELOCITY (the speed at which the note was played). The range is 0 - 127.

A DUR value will be displayed only for note ON events. The DUR value is the number of clock steps for which a note is to be held down and must be between 0 and 255. The DUR value should normally be a little shorter than the time of the next event, unless you want the note to 'ring out' while the next note plays. .

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	4	ON	6 3	25	10
1-13	2	12	4	ON	E 4	94	48
4-37	3	24	4	ON	B 4	69	12
4-49	4	12	4	ON	D 5	64	10

Notice that the 2nd event has a DUR value of 48; it will continue playing and actually sound longer than the following note. When sending notes to an instrument in MONO mode, you must be very careful that the DUR value is shorter than the TIME of the next note. Some instruments may abruptly shut off the

note, making an undesirable sound.

A DUR value of 0 tells the program that the note is to be held down until a corresponding note OFF event occurs for the same key. Every note ON with a DUR of 0 must have a matching note OFF.

Duration 0 must be used if you need to hold down the note for more than 255 steps (2 and 2/3 measures), if you need note OFF velocity, (T8 & Oberheim Expander use this), or if you need more than 32 notes held down at once.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	4	ON	6 3	25	0
1-1	2	0	4	ON	E 4	94	0
4-1	3	384	4	OFF	6 3	69	0
4-1	4	0	4	OFF	E 4	64	0

In this example two notes are turned on and four measures later, both notes (6 3) are turned off.

A note ON event with a DUR greater than 0 does not require a note OFF event.

PROGRAM CHANGE

Program Changes will make the instrument on that specified MIDI channel change programs. You should make sure the instrument is not currently playing a note when it is to change sounds. Some instruments may quietly shut off the note and make the change, while other instruments will make a very undesirable popping sound when changing.

When making a PROGRAM CHANGE, the value entered under Note would represent a new program number. NOT ALL INSTRUMENTS begin program numbering with 0. On a DX7, for example, the program number specified by the sequence should be 1 less than the number desired on the instrument. To call program 27 on a DX7, you would type the following:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	4	PG	26		

Instruments which use the Bank feature to access programs generally use a format like 11-18, 21-28, 31-38 etc. In this case, calling program 0 from the Sequencer will set the synth to program 11; calling program 9 from the Sequencer will set the synth to program to 22.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	4	PG	0		
1-1	2	0	2	PG	9		

NOTE - the following three events CC, AT, and PB events use up lots of memory and need a lot of events to maintain a 'resolution' to the effect. It would be more effective to record these events in real-time with the MIDI non-KBD on and then have a SEQUENCE START EVENT call them whenever a modulation effect was

needed. Though to suddenly 'turn on' a modulation might be useful.

CONTROL CHANGE

CC events are control events. They can be generated by a MOD wheel, MOD pedal, joystick, sustain pedal etc. A CC event of type 1 is normally generated by the modulation wheel (on a DX7 for instance). Another instrument may use a joystick for CC event type 1.

When the TYP event is a CONTROL CHANGE (abbreviated CC), the value under NOTE will represent the control parameter being changed. Each modulation device will have a different Control number. On a DX7, the sustain pedal = 64, Mod wheel = 1, Mod pedal = 4 etc. Control parameter numbers differ between manufacturers, so consult your instrument documentation. Early DX7s use control parameter 3 for after touch, and will not respond to AT type events.

SIX-TRAK owners should note that all patch parameters can be changed through MIDI, separately for each voice if the instrument is in mono mode. See your Owners manual for details.

The value under VEL will be the new value for a control parameter. The range is 0 - 127, but only certain values may be valid for a particular instrument and type of CC event.

CC events do not use the DUR column. Control Change 1 = a MOD WHEEL.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	1	ON	D 5	60	44
1-8	2	7	1	CC	1	2	
1-8	3	0	1	CC	1	4	
1-9	4	1	1	CC	1	6	
1-10	5	1	1	CC	1	8	
1-10	6	0	1	CC	1	10	

AFTER TOUCH

If the TYP event is an AFTER TOUCH (or pressure), the NOTE value entered should be from 0 - 127. AT events use up lots of memory.

AT events do not use the VEL or DUR columns.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	4	ON	F 4	109	184
1-2	2	1	4	AT	3		
1-2	3	0	4	AT	4		
1-3	4	1	4	AT	5		

PITCHBEND

The value entered under Note for PITCHBEND can be in the range of -8192 to 8191. MIDI specs allow 14 bits for pitchbend, hence the large numbers. Not all synths interpret these values similarly, so experiment and check your manual.

PB events do not use the VEL or DUR columns.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	1	ON	C 5	91	31
1-11	2	10	1	PB	390		
1-11	3	0	1	PB	650		
1-11	4	0	1	PB	910		

SIN6LE BYTE EVENTS

A SIN6LE BYTE EVENT may be sent over MIDI by entering a * under event TYP and the byte value (0 - 255) under NOTE. You may send any system common or system exclusive information from your sequences. When sending a SIN6LE BYTE COMMAND from the KCS, specify the command in decimal. Some instrument manuals may show commands in HEX. In the following example, the single byte event would send a MIDI START command to all devices assigned to MIDI channel 1.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	1	*	250		

NOTE - IT IS THE USERS RESPONSIBILITY TO UNDERSTAND HOW A PARTICULAR INSTRUMENT WILL RESPOND. PLEASE DO NOT CALL DR. T'S SOFTWARE WITH QUESTIONS RE6ARDIN6 THE RESPONSE OF YOUR INSTRUMENTS TO SYSTEM DATA.

SEQUENCE EVENTS

There are four types of sequence events that can control the playing of other sequences. These are sequence start events (call primary sequences), ST events (call secondary events or call primary sequences), XX events (stop a sequence), and KY events (turn on any computer key).

Sequence start, ST and XX events can be created ONLY using the TYPE FROM COMPUTER KEYBOARD record option, or from the edit screen. KY events can be recorded in real-time record or TYPE FROM COMPUTER KBD.

SEQUENCE START EVENTS

Sequence Start events are used to call any PRIMARY SEQUENCE(1 - 9, A - X), When a SEQUENCE START event is encountered. the sequence whose key is specified will be started automatically. The value under NOTE will be a pitch transpose in half-steps. The allowed range is -64 to 63. If a note is transposed out of MIDI KBD range, it will transposed to the end of its range.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		A	2	0	1
1-13	2	12		2	-4	0	1
1-25	3	12		F	0	0	1

The value under VEL is a VELOCITY transpose for the Sequence. A negative value of the VELOCITY transpose may prevent some notes in the Sequence from sounding.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		A	0	4	1
1-13	2	12		2	0	-10	1

The value under DUR is the number of times a SEQUENCE START EVENT will repeat. It overrides the originally programmed repeat value for the Sequence.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		A	0	0	2
1-13	2	12		2	0	0	8

W in the DUR column represents a WAIT command. This causes the CONTROL SEQUENCE to wait until the SEQUENCE START EVENT has finished before any new events can begin.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		A	0	0	4
2-1	2	96		E	-2	8	1
5-1	3	288		A	7	12	2
5-1	4	0		B	0	0	2W

ST EVENTS

ST events are another form of sequence start event. Secondary sequences can ONLY be started using ST events. To type in an ST event, put the desired event time under the TIME column, put ST under TYPE, and put the desired sequence (primary or secondary) under NOTE. The sequence MUST be LEFT-JUSTIFIED in the NOTE field. If you would like to specify a pitch transpose, enter it in the VEL field. Specify the number of repeats under DUR. You cannot specify a velocity transpose with an ST event.

Note that secondary sequences CAN start other sequences (including primary) with sequence start events.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		ST	01	0	1
2-1	2	96		ST	23	8	2
3-1	3	96		ST	A	0	4W

XX EVENTS

XX events are sequence STOP events. They allow you to automatically stop a sequence, even in the middle of playing! To enter an XX event, type the letters XX under TYP, and the desired sequence, left justified, under NOTE.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
3-1	1	192		XX	23		
7-1	2	384		XX	A		
15-1	3	768		XX	01		

KY EVENTS

The values under the NOTE column for KY events represent the C128 ASCII code. When KY events are encountered in a sequence, the program will act as though the key with the specified ASCII code was pressed. You can use KY events to start or stop sequences, insert mutes and unmutes or add real-time transposes to your sequences.

Recording KY events in real-time allows you to record a performance using the real-time control aspects of the sequencer. If you turn on the COMPUTER flag on the real-time record options menu, every key press will be recorded as a KY event. These can, of course, be edited like any other kind of event.

Note that KY events apply to the PRIMARY sequences only and that KY events will NOT be executed when the program is chasing a cue point or MIDI song pointer.

To enter a KY event in TYPE FROM COMPUTER KBD, type the letters KY under TYP, and the C128 ASCII value of the key desired under NOTE. The following example will turn on sequence 1, four measures later sequence 2 will start and four measures later, sequence one will be shut off.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1- 1	1	0		KY	49		
5- 1	2	384		KY	50		
9- 1	3	384		KY	49		

C128 ASCII CODES

A table of C128 ASCII codes is listed below and can also be found on page 357 of the system guide that came with your C128. Use this chart when entering values or to ascertain what sequences have been activated when reading a list of KY events. A MUTED sequence may be UNMUTED by entering the KY value for that particular sequence again.

SEQ	KY to MUTE		SEQ	KY to MUTE		SEQ	KY to MUTE		TRANS UP	KY	TRANS DOWN
1	49	33	D	68	196	P	80	208	+	43	219
2	50	34	E	69	197	Q	81	209	-	45	221
3	51	35	F	70	198	R	82	210	\	92	169
4	52	36	G	71	199	S	83	211	HOME	19	147
5	53	37	H	72	200	T	84	212	DEL	20	148
6	54	38	I	73	201	U	85	213	@	64	186
7	55	39	J	74	202	V	86	214	*	42	192
8	56	40	K	75	203	W	87	215	^	94	222
9	57	41	L	76	204	X	88	216	(RET)	13	141
A	65	193	M	77	205	Y	89	217	CRSR UD	17	145
B	66	194	N	78	206	Z	90	218	CRSR LR	29	157
C	67	195	O	79	207	0	48		LARROW	95	

DE EVENTS

DE events are used at the end of sequences to instruct the computer to wait a specified number of steps before looping or going on to play the next sequence. In the following example Sequence A would start (and repeat 4 times), 4 measures

later (384 clock counts) this sequence would end. Control would then go back to the sequence which had called this one.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		A	0	0	4
5-1	2	384		DE			

DE may also be used to erase or silence a wrong note without affecting the timing of subsequent events.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	1	ON	A 4	64	12
1-13	2	12	1	DE			
1-25	3	12	1	ON	6 4	80	11

CONTROL SEQUENCES

A Sequence which consists of SEQUENCE EVENTS (SEQUENCE START, ST, XX, or KY) is called a CONTROL SEQUENCE. You may find it beneficial to record individual sequences or parts of songs and then use CONTROL SEQUENCES to call them up. This example will start 3 sequences together and then 4 measures end.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		A	0	0	1
1-1	2	0		7	0	0	1
1-1	3	0		2	-4	0	1
5-1	4	384		DE			

When the CONTROL SEQUENCE which follows is started, Sequence A and B immediately starts and will play 4 times. One measure later, Sequence 15 (which is a SECONDARY sequence) starts playing for 2 times. Two measures later, Sequence B is forced to shut off, Another two measures later, the KY event will mute sequence A (97 = SHIFT A).

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		B	0	0	4
1-1	1	0		A	0	0	4
2-1	2	96		ST	15		2
4-1	3	192		XX	B		
6-1	4	192		KY	97		

ENTERING VALUES

A valid entry must be typed under each heading (from TIME to DUR) to create a proper entry. After you enter data, press (RETURN) and the program will process the line. If your entry contains wrong or out of range data, the program will respond with an INVALID ENTRY message.

If you wish to change the previous line, enter the letter C (RETURN). The cursor will go back to the previous line and you make make any desired changes. You may also make your corrections later using EDIT.

USING DEFAULTS

Once you have entered the first line, the program can supply default values for subsequent entries. Your first entry must contain data for TIME, CH, TYP and NOTE. VEL and DUR have initial defaults of 64 and 12.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	1	ON	C 4	64	12
	2	-					

If you do not wish to change CH, TYP, VEL and DUR for subsequent entries, just enter data for the TIME and NOTE. The NOTE may also default to the last value. You can save typing by using a "/" to separate fields. If you type 0/E4, you will get:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	1	ON	C 4	64	12
1-25	2	24	1	ON	E 4	64	12
	3	-					

The OCTAVE defaults separately from the NOTE, so you need not specify octave if you stay within the current octave. Typing H/6/80/24 uses the current octave default, but changes the NOTE, VEL, and DUR values.

1-73	3	48	1	ON	6 4	80	24
	4	-					

Use double slashes // to default a field. Typing 0/C5//12 defaults the VEL value but changes the DUR value.

2-1	4	24	1	ON	C 5	80	12
	5	-					

EDITING WHILE IN TYPE FROM COMPUTER MODE

You may go into the EDIT mode by pressing Z (RETURN). Any EDIT function may be performed. To re-enter the TYPE FROM COMPUTER mode, use the EXTEND COMMAND.

PLAYING WHILE IN TYPE FROM COMPUTER MODE

You may PLAY sequences while in the TYPE FROM COMPUTER KBD mode. Press P and (RETURN); the sequence will play what has been recorded so far. To play the current Sequence again, press the Z key.

Typing P2-14 (RETURN) would PLAY events 2 - 14.

Any previously recorded sequence may be played by pressing F5, then the desired Sequence keys, and then starting the drum machine or pressing the (SPACEBAR) if using the INTERNAL CLOCK.

Press F1 to return to the ENTRY mode (the cursor will start blinking again) to continue entering new notes in the note list.

To exit from the COMPUTER KBD ENTRY mode, hit X and (RETURN). The program will return to the MAIN MENU.

3. EDIT

The EDIT option is used to add, delete, or change events in existing Sequences. You may change the pitch, time, note duration, and velocity of any notes. You can insert or remove any MIDI data, and perform permutations to sequences, In many respects, the EDIT function works like a word processor.

Upon selecting EDIT, the program will ask for a Sequence key or number. After you specify a Sequence, a new screen will appear:

```
SEQ 2          PLAY ENDED AT 14

(A)LGORITHMIC EDIT   (P)LAY EVENTS
(B)ACKUP SEQUENCE    (Q)UICK LIST/EDIT
(C)OPY EVENTS        (R) SET REPEATS
(D)ELETE EVENTS      (S)WITCH CHANNELS
(E)XTEND SEQUENCE    (T)RANSPOSE/AUTO
(F)ILTER MIDI DATA   (U)P PAGE
(G)ET BACKUP SEQ     (V) DOWN PAGE
(H)ARD COPY          (X) EXIT
(I)NSERT EVENTS      (Y) CLEAR DELETES
(L)IST AND EDIT      (Z) EDIT NEW SEQ
(M)OVE EVENTS        (*) PLAY FROM CUE
(N)AME SEQUENCE      (@) STEP-TIME
                     (!) MAIN MENU

PRECEDE OPTION WITH M TO SPECIFY
MEASURE RANGE

END A OR T COMMAND WITH F1 TO
USE SELECTION CRITERIA.

SEQ 2          99 REP   96 STEPS/MEAS
```

The Sequence key or number will be displayed, as will the Sequence name if one has been specified. The number displayed after LAST PLAY ENDED AT is the number of the last event sounded when the PLAY function was cancelled. You can use this information to find bad notes in a Sequence.

To select an option press the first letter of the desired command. You may specify a range of measures or event numbers. These options will be discussed after describing all the EDIT commands.

ALGORITHMIC EDIT OPTIONS

Algorithmic edit options provide some of the more esoteric edit functions. They are selected with the A command. You can specify an event or measure range, as you would with the L or T commands. To invoke the Selection Criteria options

(described later in this chapter), end your command with X or F1. Selecting ALGORITHMIC EDIT will cause the following menu to be displayed:

```
ALGORITHMIC EDIT OPTIONS
1.  DELETE EVENTS
2.  DELETE 'IN PLACE'
3.  SET TIME
4.  SET PITCH
5.  SET VELOCITY
6.  SET DURATION
7.  MATCH RHYTHM PATTERN
8.  MATCH PITCH PATTERN
9.  MATCH MIDI CHANNELS
10. MATCH VELOCITY PATTERN
11. MATCH DURATION PATTERN
12. REDEFINE SCALE
13. REDEFINE RHYTHM
14. ADD SEQUENCE START EVENT
15. RESCALE VELOCITIES
16. PERMUTE EVENTS
ENTER OPTION:
```

All options except for 1 and 2 will process NOTE events only. The options are used as follows:

1 - 2. DELETE EVENTS/DELETE 'IN PLACE'

These options delete events from the note list. The difference between them is that DELETE EVENTS merely removes the events from the note list, while DELETE IN PLACE takes the time of each deleted event and adds it to the time of the next subsequent event that is not deleted. DELETE 'IN PLACE' thus removes notes and does not affect the timing of the sequence as a whole.

You can think of DELETE as analogous to cutting events out of a piece of recording tape and then splicing the tape, and DELETE 'IN PLACE' as analogous to erasing the events from the tape. If you have a sequence with a section that you would like to re-record, use DELETE 'IN PLACE' to erase the incorrect notes, and use OVERDUB or RECORD WITH CUEING to record a new part. Use DELETE 'IN PLACE' along with some selection criteria, to 'knock holes' in a dense repeating passage without changing the overall timing.

3 - 6. SET TIME/PITCH/VELOCITY/DURATION

These very simple options allow you to set the time, pitch, velocity, or duration of every note processed. The program will ask you to enter the desired value. You can use this to create arpeggiator like sequences or to even off dynamics or note duration in a sequence. You can get all kinds of effects by using this with selection criteria. Note that you can use AUTO CHANNEL ASSIGN, with identical starting and ending channels, to set the MIDI channel of each note to the same value.

7 - 11. MATCH RHYTHM/PITCH/MIDI CHANNELS/VELOCITY/DURATION PATTERNS

These options allow you to take the pattern of any of the five parameters above

from ANOTHER SEQUENCE and use that pattern to determine the values of the selected parameter in the sequence being edited. For example, lets suppose that sequence R has three notes and a DE event as follows:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1- 1	1	0	1	ON	C 4	111	6
1- 13	2	12	2	ON	C 3	33	3
1- 19	3	6	1	ON	E 3	66	3
1- 37	4	18		DE			

If we are editing a sequence and MATCH PITCH PATTERN against this sequence, the pitches of the sequence being edited will be changed to C4, C3, E3, C4, C3, E3, C4, ... If we MATCH MIDI CHANNELS, the second, fifth eighth etc. notes will be on channel 2, while the others will be on channel 1. Matching velocity and duration pattern will produce similar results. Matching RHYTHM PATTERN will cause the time series to become 0, 12, 6, 18, 12, 6, 18, 12 ... . This time series will cause our sequence to have the same rhythm pattern as does sequence R when it is looped.

One practical application of this feature occurs if you have a piece with a complex, but repeating, rhythm pattern and a non-repeating pitch pattern. Use TYPE FROM COMPUTER KEYBOARD to enter one cycle of the rhythm pattern, use STEP-TIME RECORD to enter the pitches, and use MATCH RHYTHM PATTERN to set the new sequence to the right rhythm pattern.

User's of Dr. T's Algorithmic Composer will recognize elements from Jim Johnson's Series Program, one of the THREE programs that make up the Algorithmic Composer. We would like to thank Jim for his creative input, and urge users interested in this type of composition tool to consider our Algorithmic Composer.

13. REDEFINE SCALE

This option redefines each note on the chromatic scale and adds an octave transpose if desired. You could, for example, take a passage that was played in a specific major key and move it to the corresponding minor key. The first time that you select this option, the following screen will appear:

	SCALE 1		SCALE 2		SCALE 3		SCALE 4	
NOTE	NOTE	OCT	NOTE	OCT	NOTE	OCT	NOTE	OCT
C	C	0	C	1	E	0	C	0
C#	C#	0	B	0	F	0	C#	1
D	D	0	A#	0	F#	0	D	0
D#	E	0	A	0	G	0	D#	1
E	D#	0	G#	0	G#	0	E	0
F	F#	0	G	0	D	0	F	0
F#	F	0	F#	0	D#	0	F#	1
G	G	0	F	0	A	0	G	0
G#	A	0	E	0	A#	0	G#	1
A	G#	0	D#	0	B	0	A	0
A#	A#	0	D	0	G	0	A#	1
B	B	0	C#	0	G#	0	B	0

The program will issue the prompt PRECEDE ENTRY WITH E TO EDIT. ENTER SCALE DESIRED: Selecting scale 2 would turn an ascending C scale into a descending one (except for the final C), selecting scale 4 would transpose all sharps up an octave, etc.

If you choose to edit a scale type E and a number from 1 - 4. The program will issue the series of prompts ENTER NOTE TO CHANGE OR X: ENTER NOTE: and ENTER OCTAVE: until you reply with X to the first prompt. You can thus build your own scale re-definition tables. These will be kept in program memory and saved when you SAVE ENVIRONMENT.

We would like to thank Richard Munson for suggesting this option.

13. REDEFINE RHYTHM

The REDEFINE RHYTHM option is similar to the REDEFINE SCALE option, but it alters note times instead of pitches. Selecting this option brings up a screen with four possible ways to redefine rhythm. Each redefinition table consists of a list of 12 OLD time values and 12 NEW time values. Notes with time value of 0 are assumed to be parts of chords and not processed. OLD time values of 0 therefore indicate that the line is not used. You may add more rhythm values to redefine by changing some of the old 0's to another value.

When you select a rhythm, the program will see if the time value for each note in the sequence matches any of the OLD values in the RHYTHM selected. If the time value does not match, or if it is 0, the program leaves it unchanged. If the time value matches an OLD time value in the selected RHYTHM, it is replaced with the corresponding NEW time value.

For example, RHYTHM 1 of the default sets contains an OLD time of 3 and a NEW of 6 in the first line, and an OLD of 6 and a new value of 3 in the second. Thus, any notes with times of 3 would have them changed to 6, while any notes with times of 6 would have them changed to 3.

The default rhythms can be edited and saved. The process is similar to that described under REDEFINE SCALE above. As notes whose times do not match any in the list are not changed at all, you may want to auto-correct sequences recorded in real-time before using this option.

We confess that we are unable to think of any uses for this feature in anything resembling conventional music. It seemed like it might be FUN to use, so we put it in anyway!

14. ADD SEQUENCE START EVENTS

This option allows you to add sequence start events after all notes or selected notes thus creating special effects like drum 'hits' or doubling effects on musical pharases.

The program will ask you to ENTER SEQUENCE KEY OR NUMBER: After you reply, it will ask DO YOU WANT KEY FOLLOW? If you answer no, then no pitch transpose will be applied to the sequence start events. If you answer yes, each sequence start event that is added will get a pitch transpose that depends on the note that it is being added to. This transpose will be computed so that a C4 in the started

sequence will play the corresponding note of the sequence being edited.

If you are using ADD SEQUENCE START EVENTS to create drum machine 'hits', answer the key follow question no. If you are using it to create doubling, echoes or other effects that you want to track the pitch of the original note, answer yes. If the sequence being started contains only controller data, the answer does not matter.

If the sequence that you are starting is a primary sequence, the program will next ask DO YOU WANT VELOCITY FOLLOW? If you answer yes, then a velocity transpose will be applied to each sequence start event, such that a note of velocity 64 in the started sequence will have the same velocity as the corresponding note in the sequence being edited. If you answer no, no velocity transpose will be applied.

The following example is a simple scale.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1- 1	1	0	1	ON	C 3	56	15
1- 36	2	35	2	ON	D 3	60	14
1- 74	3	38	1	ON	E 3	66	17
2- 20	4	42	2	ON	F 3	60	14
2- 56	5	36	1	ON	G 3	66	17
2- 94	6	38		DE			

After adding SEQUENCE START EVENTS with KEY FOLLOW and VELOCITY FOLLOW:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1- 1	1	0	1	ON	C 3	56	15
1- 1	2	0		V	-12	-8	1
1- 36	3	35	2	ON	D 3	60	14
1- 36	4	0		V	-10	0	1
1- 74	5	38	1	ON	E 3	66	17
1- 74	6	0		V	- 8	0	1
2- 20	7	42	2	ON	F 3	60	14
1- 20	8	0		V	- 7	9	1
2- 56	9	36	1	ON	G 3	66	17
1- 56	10	0		V	- 5	9	1
2- 94	11	38		DE			

15. RESCALE VELOCITIES

This option provides two modes of altering the dynamics of a sequence. The program will reply with the prompt (M)ULTIPLY VELOCITIES BY FACTOR OR (C)OMPRESS/EXPAND: If you choose M, the program will ask you to enter a factor, and will multiply each velocity by this factor. Of course, no velocity can exceed the MIDI maximum of 127. The (M)ULTIPLY option, like velocity transpose, allows you to increase or decrease all velocities. The way that it works may be more musically useful in some situations.

If you choose C, the program will increase or decrease the DYNAMIC RANGE of the sequence data by multiplying the DIFFERENCE between the note velocity and 64 by

the entered factor. Velocities will be kept between 1 and 127.

Note that these options require calculations that can take a long time if you are processing long sequences.

16. PERMUTE EVENTS

This is another option for making RANDOM changes to your music. We strongly suggest that you use this option with selection criteria that weed out most of the events in your sequence. A small value of probability is ideal for many situations.

The program displays a screen that shows all five parameters that could be permuted. Each parameter (TIME, CHANNEL, PTICH, VELOCITY, and DURATION) is followed by a 1 if the parameter is to be permuted and a 0 if it is not to be permuted. If all parameters are on, all aspects of the notes will be permuted. Any parameter can be selected or deselected by typing its number.

For each event permuted, the program will randomly select another note event from within the sequence range being processed. It will exchange all of the parmameters being permuted between the two events. Note that the program processes events in event order, so an event permuted from the beginning of the sequence to the end could possibly be permuted back to the beginning.

(B) BACKUP SEQUENCE

The BACKUP SEQUENCE command will make a copy of your current sequence from the edit screen. To BACKUP your edit sequence, simply type B(RETURN). It is a good idea to make a backup before making any change that can not easily be reversed such as transposes and algorithmic edits. The program will issue an error message if there is not enough room in memory for the BACKUP.

The BACKUP sequence is stored by the program as sequence Y. You can thus hear the backup sequence in play mode by pressing the Y key. If you decide that you want to keep BOTH your edit sequence and the backup, go out of edit and make a copy of sequence Y. REMEMBER, anything kept in sequence Y will be destroyed the next time you use the BACKUP command.

The GET BACKUP SEQ command EXCHANGES your current sequence data with the most recently made backup. This allows you to swap and compare the sequence made. To get the most recent backup, type 6(RETURN).

If you are planning extensive changes to a sequence, you may wish to make a copy of your original to another sequence other than Y, BEFORE going into edit, and then to make frequent backups as you edit.

(C) COPY EVENTS

The COPY EVENTS option copies part of a sequence to another point in the sequence. Type C followed by the desired range (C5-15). The computer will prompt with INSERT AFTER: The COPY will be inserted immediately after the event number you specified. The original range will remain intact.

(D) DELETE EVENTS

DELETE EVENTS will delete all events in the specified range. The program will ask ARE YOU SURE? before executing the DELETE command. The following formats can be used:

D2	delete one specific event
D5-15	delete a range of events
D26-	delete starting point to end
DM1	delete events on the MIDI channel specified

(E) EXTEND SEQUENCE

EXTEND SEQUENCE allows you to add additional events at the end of the sequence. When selected, the EXTEND SEQUENCE options will display the last 10 events of the sequence. You may then enter events exactly as described in the TYPE FROM COMPUTER KEYBOARD mode.

(F) FILTER MIDI DATA

This option removes unwanted MIDI events of a specified type from a sequence. You can specify a range of event numbers or measures just as you would with the L command (F1-, F2-50, MF etc.). If you select this option, the following menu will be displayed:

```
FILTER OPTIONS ARE:
1.  NOTES
2.  PROGRAM CHANGES
3.  CONTROL CHANGES
4.  PITCH BENDS
5.  AFTER TOUCH
ENTER OPTION:
```

You can filter any of the five types of MIDI events listed. If you select option 1, 2, 4, or 5, the program will next issue the prompt ENTER MIDI CHANNEL OR (A)LL: Respond to this prompt with the channel for which you wish to filter the selected type of MIDI events. Type A if you wish to filter on all MIDI channels.

If you select filter option 3, CONTROL CHANGES, the program will issue the prompt ENTER CONTROL TYPE: There are 128 types of MIDI control changes, with types numbered 0 through 127. The most commonly used types are:

```
CC type 1 = mod wheel;
CC type 2 = breath controller
CC type 4 = foot controller.
```

Only control events of the selected type will be filtered. Remember, the controller type appears under the NOTE heading in the event list.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	2	CC	1	1	
1-1	2	0	2	CC	1	2	
1-1	3	0	2	CC	1	2	

```
1-2  4   1    2  CC   1  3
1-2  5   0    2  CC   1  4
```

If you choose to filter notes or program changes, the program will erase all note or program change events on the selected channel(s). It will not alter the timing within the sequence.

If you choose to filter control changes, pitch bends, or after touch, another menu will appear:

```
FILTER PERCENTAGE
0.  EXIT
1.  FILTER ALL
2.  50 PERCENT
3.  67 PERCENT
4.  75 PERCENT
ENTER OPTION:
```

You can choose to filter ALL events of the selected type, or you can keep 1/2, 1/3 or 1/4 of them, and filter the rest! The purpose of this option is to allow you to converve memory (and MIDI bandwidth) by SELECTIVELY filtering MIDI data recorded from continuous controllers such as mod wheels and foot pedals. A typical foot controller transmits a MIDI message every 10 milliseconds when it is moving. Recording this much data can quickly exhaust even the 12000 event memory of the C128 KCS. Playing back this much data along with data for other instruments can 'clog' the MIDI output, causing subtle timing errors. Some instruments may experience buffer overflow and miss data altoghter!

If you choose to partially filter continuous MIDI data, the program will attempt to do so in an intelligent manner. Zero values will not be filtered out, nor will events that immediately precede a note event or events that occur 12 or more time steps before the next event. The character of your performance should thus be maintained. It is up to you to determine how much data you can filter before the increased 'graininess' becomes annoying.

Thus, there are two uses for the filter MIDI events command. You can get rid of unwanted MIDI events of a particular type, or you can partially filter continuous events to save memory and bandwidth.

For example, suppose that you have a track on MIDI channel 1, which contains note data and mod wheel events, and you want to get rid of 2/3 of the mod wheel events to save memory. You would type F at the ENTER COMMAND: prompt, to filter the entire sequence. You would select filter option 3, control changes, and specify control type 1, which is the mod wheel. You can reply to the ENTER MIDI CHANNEL prompt with either an A or a 1. There is no data on the other channels, so either will give the same result. Finally, you would reply to the filter percentage prompt with 3, to filter 67 percent of the mod wheel data.

(6) GET BACKUP SEQ

GET BACKUP will swap the current sequence being edited with the last BACKUP sequence that was made. Before making a change to a sequence, make a (B)ackup, then if you make an undesirable edit change, you can retrieve the orginal sequence with the (6) command. Note that B MAKES A COPY to sequence Y and 6

SWAPS THE CURRENT sequence with sequence Y. After using the (6) command, the Backup sequence (sequence Y) will now contain a 'modified' sequence. You might want to use the (B) command again to make a fresh copy of the original.

(H) HARD COPY

The H command prints the event list to a printer at hardware address 4. If you do not have a printer at address 4, you will get a BASIC error. Press any key to continue without loss of data.

(I) INSERT EVENTS

INSERT EVENTS will let you add new events anywhere in the sequence. Press I; the program will respond INSERT AFTER: Enter a line number; the computer will display the previous 10 lines. Then you may enter event data as described in TYPE FROM COMPUTER mode. To insert at the very beginning of a sequence, respond with 0 for the prompt INSERT AFTER:

When thru inserting, press X to return to the edit menu.

LIST AND EDIT

LIST AND EDIT will list all or part of a Sequence. The screen can hold 22 event lines. If a sequence contains more events, the screen will scroll up automatically to the last 22 events, unless you stop the LIST. The LIST command can use any of the following formats:

L	list all events
L3	list one specific event
L5-15	list a range of events
L26-	list starting point to end
LM1	list events on a particular MIDI channel

Press	LEFT ARROW	to quit LISTING and start EDITING
	ANY KEY	to stop screen display scrolling
	ANY KEY	to continue display scrolling after stopping

NOTE - you may also list by MEASURES. See USING MEASURES.

When the list has been completed or terminated using the LEFT ARROW key, you may EDIT any line disolayed. Use ARROW keys (to left of function keys), CRSR keys and (SHIFT) CRSR keys to move the cursor to the line and column you wish to change. Make changes using the SPACE and Alphanumeric keys and hit (RETURN) to update the line.

When you have completed your EDITING, you may want to check the last line of the Sequence to be sure it ends on the 1st event of a new measure. Otherwise the Sequence will not stay in sync.

The INST/DEL backs up and erases values while (SHIFT) and INST/DEL creates more space to enter new values. The TAB key advances eight spaces.

The TIME abbreviations W, H, Q, and E may be used, but they must be entered in the first column of the TIME field. You must enter data in the format and range

that is correct for the type of event that you are editing. BE SURE TO PRESS (RETURN) WHILE THE CURSOR IS ON THE LINE BEING CORRECTED.

An incorrect entry will result in an INVALID ENTRY message and no change will be made. If the new line is OK, the program will retype the line and the cursor will move to the beginning of the next line, erasing the MSR-ST #. If you change your mind about a correction, move the cursor up one line and retype, pressing (RETURN) when thru.

NOTE that the MEASURE-STEP and EVENT numbers are for the computer's use only and cannot be EDITED by you. The program WILL NOT RECOMPUTE the measure and step to reflect any changes made to the time values until you re-list the Sequence.

While the Sequence is LISTED, you may execute any of the commands listed to the right of the events list. You must leave a space at the end of the command before pressing (RETURN) to prevent the program from misinterpreting your entry.

(M) MOVE EVENTS

The MOVE EVENTS option moves part of a sequence to another location in the sequence. The MOVE option is similar to the COPY option, except that the moved portion of the sequence is deleted from its original position, while in COPY, it is in both the original and the new location.

Enter a MOVE command by typing M and the desired range (M3-15). The computer will prompt: INSERT AFTER. Enter the desired destination.

(N) NAME SEQUENCE

To use the NAME SEQUENCE option, type N (with no space), a name up to eight characters long, and (RETURN). Typing NSTRING7 would name the sequence STRING7.

(P) PLAY SEQUENCE

The PLAY option will play all or any part of the current sequence being edited one time. Pressing P will play the whole sequence. You may specify a range to play only part of a sequence. Type P20-25 (RETURN) to play events 20-25 or P15- (RETURN) to play from event 15 to the end. Typing MP will let you specify a measure start and measure stop point. After you have played the sequence once, you can replay the current sequence by pressing Z. Or hit F1 to return to the blinking cursor and press P or any other command.

TO PLAY SEVERAL SEQUENCES

To play several sequences while in edit, press P, and then F5 to shut off the clock. Next press the desired sequence keys; if you want to hear the current sequence you are editing, press Z. Finally press the space bar to start the clock again. You may also use the (*) PLAY FROM CUE command which will play any PRIMARY sequence from any measure.

(Q) QUICK LIST

QUICK LIST is basically identical to LIST and EDIT. If a sequence is really long, QUICK LIST will work faster, but it will compute MEASURE-STEP only from

the point at which the QUICK LIST begins. If you entered Q250- it would start listing from event line 250 but would display it as starting at measure 1.

(R) SET REPEATS

The R option changes the number of repeats for a Sequence ONLY WHEN THE SEQUENCE IS PLAYED FROM THE COMPUTER KBD. When recording a sequence, a default value of 99 is assigned. To change this value, type R followed by the desired number of repeats. Type R, for example, to set the number of repeats to 8.

(S) SWITCH CHANNELS

SWITCH CHANNELS re-assigns all types of events (CC, PB etc.) from one MIDI channel to another MIDI channel. Type S3-16 to switch all events on channel 3 to channel 16. If a sequence contains events on more than 1 MIDI channel, only events on the specified MIDI channel will be switched.

(T) TRANSPOSE/AUTO

The TRANSPOSE option manipulates data in a variety of ways. After the algorithmic edit, it is probably the most powerful command of the EDIT options. You may TRANSPOSE the whole Sequence by typing T, or transpose part by specifying a range, e.g. T3-14.

Selecting the T option displays a new menu.

```
TRANSPOSE OPTIONS
1.   TRANSPOSE PITCH
2.   TRANSPOSE VELOCITY
3.   TRANSPOSE DURATION
4.   AUTO-CORRECT
5.   COMPRESS/EXPAND
6.   TIME REVERSE
7.   AUTO CHANNEL ASSIGN
ENTER OPTION:
```

If you select option 1 - 3, the program responds with ENTER TRANSPOSE AMOUNT, I FOR INVERT. OR R FOR RANDOM: You may enter a positive, or negative number, or the letters I for inversion or R for random.

1 - 3.TRANSPOSE PITCH, VELOCITY, DURATION

Enter a number (-64 to 63) to perform a TRANSPOSE. A pitch transpose of -12 drops all notes down one octave, a pitch transpose of 7 would raise the pitch up 7 half-steps or a 5th. A velocity transpose of 24 increases all MIDI velocities by 24, and a duration transpose of - 3 shortens all notes by 3 time steps. The program will assign the largest or smallest allowable value to a pitch, velocity, or duration when it is transposed out of range.

NOTE - if a velocity transpose is too great, your instrument may not sound any notes.

INVERSION

Entering an I will produce an INVERSION which causes high values to become low and low values to become high. After selecting I, the program will next prompt INVERT AROUND: The allowable range is 1 - 127. The program will perform the inversion around the value you enter. For example, if you invert velocity around 50, a velocity of 70 will become 30, while a velocity of 20 will become 80.

INVERSION OF	CENTER PT	EFFECT
PITCH	C4	high/low notes
VELOCITY	60	loud/soft vol or open/closed filter
DURATION	60	short/long notes

If you are inverting pitch, the number that you enter will be the MIDI key number of the pitch that you wish to invert around. MIDI key numbers range from 0 for thelowest MIDI key (C - 1 in our notation), to 127 for the highest 69. Middle C, C4, has a key number of 60, E4 a number of 64, C5 (one octave above middle C) a number of 72, etc.

It is possible to transpose PITCH, VELOCITY and DURATION out of useful range. Most synthesizers will not respond to the entire MIDI keyboard, and will transpose extreme values into their own range. On some synths, you can transpose the pitch up so high, that the Sequence will consist of only one note. Small velocities and/or short durations may result in notes that are not audible.

RANDOM

Typing R in response to the TRANSPOSE AMOUNT will cause the program to transpose notes by a RANDOM amount. The program will then ask ENTER MAXIMUM TRANSPOSE AMOUNT: The value entered will be the largest number of units that any note can be transposed by in the operation.

The program will then ask SELECT (P)OSITIVE, (N)EGATIVE, OR (B)OTH: Make your selection concerning the SIGN of the random transposes by typing P (transpose will only go positive), N (transpose will only go negative), or B (transpose will go in both directions).

The program will then ask SELECT (E) ALL PROBABILITIES EVEN, OR (S) PROBABILITY SCALED: Type E if you want all transposes from 0 to the maximum value selected to occur with equal proability, or S if you want small transposes to be more likely than large ones.

Random transposes are probably best used with the selection criteria described at the end of this chapter.

4. AUTO-CORRECT

When you select the AUTO-CORRECT option, the program asks for two values, EVENT STEP COUNT, and DURATION COUNT, IF DESIRED. The EVENT STEP COUNT is the quantization value for note separations (the value under the TIME column). All values under the TIME column will be rounded off to the nearest multiple of the EVENT STEP COUNT entered. If you enter a EVENT STEP COUNT of 12, all events will be quantized to the nearest 8th note.

With a 96 steps/measure clock, use the following table:

3 for 32nd notes
4 for 16th note triplets
6 for 16th notes
8 for 8th note triplets
12 for 8th notes
16 for quarter note triplets
24 for quarter notes
48 for half notes
96 for whole notes

The DURATION COUNT is a similar quantization value for note durations. Enter a (RETURN) for duration if you do not want to change the duration times (DUR values).

Remember when AUTO CORRECTING that you will normally want to have the DURATION time shorter than the EVENT STEP time, otherwise the notes will 'run' into each other with possibly undesirable results. If you are a stickler for perfection you may AUTO CORRECT both STEP and DURATION with the same value and then use a minus DURATION transpose (-2 or -3) to make the note duration time shorter.

After you've entered the EVENT STEP and DURATION COUNT values, the computer will ask ARE YOU SURE? Verify with a Y or hit any other key to return to the edit menu.

5. COMPRESS/EXPAND

The COMPRESS/EXPAND option changes the timing of the overall sequence. This option can also be used to speed up or slow down a Sequence, relative to the other Sequences in your song.

When the COMPRESS/EXPAND option is selected, the program will respond with ENTER FACTOR: Each time value in the Sequence will be multiplied by the entered factor. To COMPRESS/EXPAND note DURATIONS, follow your entry with a D.

A FACTOR OF	results in
2D	EVENT & DURATION being twice as long
4	EVENT 4X longer, DURATION remains the same.
.5D	EVENT & DURATION being half as long.

6. TIME REVERSE

The TIME REVERSE option will re-arrange events so that they play in reverse order. You will probably want to move the ending DE event which has now become the first event, back to the end of the Sequence.

Due to the way the C128 addresses memory, it is possible you might get an error message then using time reverse. If this occurs, use the COPY/APPEND feature to make a copy of the sequence you are working on, and then time-reverse the copy.

7. AUTO CHANNEL ASSIGN

AUTO CHANNEL ASSIGN will re-assign each consequtive event to a different MIDI channel. When selected you will be prompted with ENTER STARTING CHANNEL, then

ENDING CHANNEL. The ENDING CHANNEL must be the same or a higher value. The program will then assign each consequtive note to the next higher MIDI channel staying within the specified range. You can re-assign notes to one MIDI channel by entering the same value twice. This executes more rapidly than the S (Switch MIDI Channel) command, but will not change CC of PB events etc.

After completion of the TRANPOSE options the main EDIT screen will be displayed.

(U) UP PAGE and (V) DOWN PAGE

The U for up page and V for down page commands are simple commands to allow you to page though the event list. They are intended primarily for use when you have interrupted a long list.

(U)P PAGE will cause the program to list a new screen of previous notes, ending a few notes after the first note listed. If you enter a U command with less than a full screen displayed, the listing may go up somewhat more than a full page.

(V) DOWN PAGE will cause the program to list a new screen of notes, later in the sequence, starting a few notes before the last note listed.

(X) EXIT

To EXIT from the EDIT menu, type X (RETURN) or the F1 key. If you are in LIST AND EDIT, type X (RETURN) twice.

(Y) CLEAR DELETES

The Y command erases any DE events in the sequence, other than the last DE event at the end. The time of each DE event erased is added to the time of the next non-DE event in the sequence. Using this command improves the readability of a sequence listing after you have put in several DE events.

(Z) EDIT NEW SEQUENCE

With The Z command you can switch sequences (that you are editing) without returning to the main menu. Simply type Z, followed by the sequence key or number that you wish to edit, a space, and (RETURN). For example - Z15 (RETURN) or ZB (RETURN) etc.

(*) PLAY FROM CUE

The * command plays ANY PRIMARY sequence starting at any measure. Type * followed by the sequence desired, a dash, and the desired measure number. Thus *2-12 will start sequence 2 from the beginning of the 12th measure, and *A-1 will start sequence A from the beginning. All sequence start events up to the cue point will be executed, as will program and timing changes. No MIDI events other than program changes will be sent until the cue point is reached.

You can restart the same cue by pressing the Z key. Go back to edit by pressing F1, as you would when using the P command. If you later go into play mode, the TAB key will replay the last cue used.

This option allows you to hear changes that you made to a sequence in the context of the whole song, without playing the song from the beginning. Suppose that your song is sequence S, and you are editing one of the sequences that is called up by sequence S. You have just made some changes that will occur in the 30th bar of the song. Entering the command *S-28 will allow you to hear the song play starting at the 28th bar. You will be able to hear the effect your changes had in the context of everything else that is going on in the song at the time. All previous program and tempo changes will have been executed before play begins.

The TAB key will play back the last CUE specified either in the EDIT mode or the regular PLAY mode.

(@) STEP-TIME

The @ option allows you to append music to the end of your sequence using the STEP-TIME ENTRY feature of the program. The program will ask you to specify an ECHO CHANNEL, if needed, and puts you in STEP-TIME ENTRY. All step-time features are active, and the notes played are added to the end of the sequence. When you exit, you go back to editing your sequence.

(!) MAIN MENU

With the ! option, you can select any main menu option directly from the edit screen. Type ! followed by the option number and (RETURN). For example, !1(RETURN) will call up the play screen or !2(RETURN) to enter the record mode.

DEFINING RANGES FOR EDIT OPERATIONS

You may define a range for the A, C, D, H, L, M, P, Q, and T commands by specifying either line #'s or Measures.

USING LINE NUMBERS

Typing a command letter effects the entire sequence. Typing a command letter and 1 number effects 1 event. Typing a command letter and 2 numbers seperated by a " - " results in a range being edited. Listing 1 number and a " - " results in editing from the first line number to the end of the sequence.

Entering a M and a number from 1 - 16 will edit events on a particular MIDI channel. This will work with the L, H, D, and Q commands. Below are some examples showing the use of line numbers:

H	hard prints entire sequence
D2	delete one specific event
C5-15	copy events 5 - 15 events
A2-30	alg. edit on events 2 - 30
L26-	list from event 26 to end
T6-	transposes events 6 to end
DM1	delete events only on MIDI channel 1

The TWO EXCEPTIONS to using line numbers are:
You can't delete all events (use DELETE SEQUENCE, menu 2).
You can' transpose by MIDI channel.

If you want to use Selective Criteria, press the F1 key after specifying the range.

USING MEASURES

To use the measure range, type M and then the desired command letter. The program will prompt with ENTER MEASURE START and then ENTER MEASURE END (E FOR ALL). Enter the desired values to both prompts and then the desired edit option will take place.

USING THE SELECTION CRITERIA

Selection Criteria lets you 'limit' the amount of changes that are made to a sequence in a controlled, creative, and intelligent manner. The selection criteria can be used with TRANSPOSE options pitch, velocity, duration and auto channel assign or any of the options on the algorithmic edit menu.

To use SELECTION CRITERIA enter a T or A command with F1, or X(RETURN). For example, type T and F1 to transpose the entire sequence using selection criteria, or A1-40 F1 to do an algorithmic edit on the first 40 events with selection. After you have made your transpose or algorithmic selection, the following screen will appear:

```
EVENT SELECTION CRITERIA
0.  EXIT
1.  MIDI CHANNEL
2.  EVERY N'TH NOTE
3.  RANGE OF PITCHES
4.  RANGE OF VELOCITIES
5.  RANGE OF DURATIONS
6.  RANGE OF TIMES
7.  BY POSITION ON CHROMATIC SCALE
8.  WITH SELECTED PROBABILITY
9.  SCALE RESULT
ENTER OPTION:
```

Any option or COMBINATION OF OPTIONS from this menu can be selected. All of the operations in transpose or algorithmic edit are performed on NOTE events only, except for DELETE and DELETE IN PLACE. If selection criteria are used, these operations will also be performed on NOTE events only.

You can select any criterion that you like from this menu. After you have selected it, an indication of the selection will appear to the right of the menu item. You can then select additional criteria. ONLY NOTES THAT MEET ALL OF THE CRITERIA SELECTED WILL BE PROCESSED. You can de-select a previously selected criterion by pressing its key.

The program will ask ARE YOU SURE? before making any changes. Answering Y will go ahead with the selected options, any other key will return back to edit.

TO REVERSE SELECTION CRITERIA

If you select any of the first seven criteria, the words FOLLOW ENTRY WITH F1 TO REVERSE will appear above the prompt. Follow your entry with F1 if you wish to process only notes which DO NOT meet the criterion selected.

0. EXIT

Use EXIT after making your selections or if you change your mind about using SELECTION CRITERIA.

1. SELECTION BY MIDI CHANNEL

If you choose this option, the program will prompt ENTER MIDI CHANNEL: Reply with the channel of the notes you want processed.

2. EVERY N'TH NOTE

When selected, the program will prompt ENTER N: and process only every N'th note. For example, if you reply with a 4, the program will process the 1st, 5th, 9th, 13th etc. notes, and not change any of the others. If you reply with 4 and F1, the program will process all notes except the 1st, 5th etc.

3 - 6. RANGE OF PITCHES/VELOCITIES/DURATIONS/TIMES

These criteria process only notes that fall within a selected range of pitch, velocity, duration or time (since previous event). RANGE OF PITCHES allows after the fact keyboard splitting. (See ADVANCED USER - KBD SPLITTING A SEQUENCE) Range of velocities allows you to process notes according to the dynamics with which you played them, while range of durations and times allow you to process notes according to phrasing, e.g processing only notes held down for a long time or played shortly after the preceding note.

Selection of any of these criteria causes a menu to pop up at the bottom of the screen.

```
FOLLOW ENTRY WITH F1 TO REVERSE. PRECEDE ENTRY WITH E TO EDIT
 1        C -1 TO C  3
 2        C -1 TO C  4
 3        C -1 TO C  5
 4        C -1 TO C  6
ENTER SELECTION:
```

You can select any of the choices displayed. You may edit and change any of the choices by typing E followed the choice number. Suppose, for example, that you want to process notes in the range C4 to C6. Type E1(RETURN). The program will ask you to enter the beginning and end of the desired range. You will enter C4 and C6 in reply. The range C 4 TO C 6 will appear to the right of the RANGE OF PITCHES line on the selection menu. Only notes in this range will be processed by the transpose or algorithmic operation.

This option can be used to strip out specific instruments in a MIDI drum part. Say for example you wish to strip out the hi-hat part of of the following sequence:

```
MSR-ST  EVNT  TIME CH TYP NOTE VEL DUR
------- ---- ----- -- --- ---- --- ---
  1-1    1     0     1 ON  A  2  73   1
  1-1    2     0     1 ON  A  3 101   1
 1-13    3    12     1 ON  A  3 101   1
 1-25    4    12     1 ON  E  3  53   1
 1-37    5    12     1 ON  A  3 101   1
 1-49    6    12     1 ON  A  2  73   1
 1-49    7     0     1 ON  A  3 101   1
 1-61    8    12     1 ON  B  3  49   1
 1-61    9     0     1 ON  A  2  73   1
 1-73   10    12     1 ON  E  3  53   1
 1-73   11     0     1 ON  A  3 101   1
 1-85   12    12     1 ON  B  3  49  10
 2-1    13    12       DE
```

Select the Algorithmic edit with Selection Criteria by pressing A(F1 key). Next select option 2 DELETE IN PLACE. For Selection Criteria, select RANGE OF PITCHES. Then press E2 (to edit line 2). Enter the values of A3 and B3 (these are the key notes for the closed and open hat on a Yamaha RX11 - check the key values for your drum machine). After editing option 2, the display should now look like:

```
FOLLOW ENTRY WITH F1 TO REVERSE. PRECEDE ENTRY WITH E TO EDIT
 1        C -1 TO C  3
 2        A  3 TO B  3
 3        C -1 TO C  5
 4        C -1 TO C  6
ENTER SELECTION:
```

Press (RETURN) to complete the process and Y for ARE YOU SURE? Relist you sequence - the hat hat parts are gone, just the kick and snare are there, and the timing of the sequence will still be intact.

```
MSR-ST  EVNT  TIME CH TYP NOTE VEL DUR
------- ---- ----- -- --- ---- --- ---
  1-1    1     0     1 ON  A  2  73   1
 1-25    2    24     1 ON  E  3  53   1
 1-49    3    24     1 ON  A  2  73   1
 1-61    4    12     1 ON  A  2  73   1
 1-73    5    12     1 ON  E  3  53   1
 2-1     6    24       DE
```

The new range of pitches will remain in memory for future use, and be saved on disk if you save your working environment. On a later session you can load the ENVIRONMENT again.

The other range options work almost identically to the RANGE OF PITCHES option. The only difference is that you specify a range of numerical values instead of a range of note values.

7. BY POSITION ON CHROMATIC SCALE

The first time you select this option, the following menu will appear:

```
FOLLOW ENTRY WITH F1 TO REVERSE.  PRECEDE ENTRY WITH E TO EDIT.
 1        C  D  E  F  G  A  B
 2        C  C# D  D# E  F
 3        C  D  E  F# G# A#
 4        C  C# D# E  F# G  A  A#
ENTER SELECTION:
```

If you make a selection, only those notes whose positon on the scales matches one of the notes on the entry selected will be processed. Thus, selecting option 1 will cause only naturals to be processed, while typing 1 F1 to reverse it will cause only sharps to be processed. If you choose to edit a selection, the program will prompt ENTER PITCH TO CHANGE OR X: Any pitch that you type will be added to the list if it is not present, or removed if it is. Thus you can process only the C#'s, for example.

Any edits stay in program memory, and get saved in an environment save.

8. WITH SELECTED PROBABILITY

This option allows you to select the notes to be processed RANDOMLY. The program prompts ENTER PROBABILITY (IN PERCENT): If you reply, for example, with 25, then each note will have one chance in four of being processed.

Interesting effects can be obtained by copying a short passage to itself a few times, and transposing up or down an octave, or changing MIDI channel with AUTO CHANNEL ASSIGN, using the WITH SELECTED PROBABILITY selection criterion.

9. SCALE RESULT

This is not strictly a selection criterion, as it does not prevent any notes from being processed. What SCALE RESULT does is cause the amount of the change made by the operation to be SCALED according to the position of the note processed in the note list.

If you select this option, the program will prompt START SCALE AT S:, where S is the first event in the range being processed (1 if the whole sequence is being processed). You can reduce this number, or even make it negative. Increasing it will have no effect. The program will then prompt END SCALE AT: E, where E is the last event being processed. You can change this number, but cannot make it smaller than the first event of the range. When you first use this option, we suggest that you NOT CHANGE the default values of S and E.

After the program performs the operation that you selected, the program will reduce the amount of change to any event with an event number less than the selected END SCALE value. The amount of change will be given by the equation

```
SCALED CHANGE = UNSCALED CHANGE X (EVENT POSITION - START OF SCALE)/
                (END OF SCALE - START OF SCALE)
```

NON-MATHEMATICIANS will be better off ignoring the above equation and considering the following example. Suppose we have a sequence all of whose note velocities are 64. Suppose we process it with the SET VELOCITY option, setting the velocity to 127. Suppose we SCALE the result, using the default values for start and end of scale. The first note of the sequence will not be changed at all. The velocity of each subsequent note will be increased somewhat. Only the last note will have a velocity of 127. We have created a crescendo. A decrescendo could have been created by using SET VELOCITY with a value of 0. Reducing the END OF SCALE value would cause the velocity to reach its final value somewhat before the end of the sequence.

To scale a sequence so that it becomes louder and brighter over time, we would do the following. Before editing let's list the sequence. Notice the velocities are all the same. You may or may not want to use the SET VELOCITY option first.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	4	ON	C 3	64	10
1-13	2	12	4	ON	D 3	64	10
1-25	3	12	4	ON	E 3	64	12
1-37	4	12	4	ON	F 3	64	10
1-49	5	12	4	ON	G 3	64	10
1-61	6	12	4	ON	A 3	64	10
1-73	7	12	4	ON	B 3	64	12
1-85	8	12	4	ON	C 4	64	10
2-1	9	12	4	ON	D 4	64	10
2-13	10	12	4	ON	E 4	64	11
2-25	11	12	4	ON	F 4	64	12
2-37	12	12	4	ON	G 4	64	10
2-49	13	12	4	ON	A 4	64	12
2-61	14	12	4	ON	B 4	64	10
2-73	15	12	4	ON	C 5	64	10
2-85	16	12	4	ON	D 5	64	10
3-1	17	12	4	ON	E 5	64	12
3-13	18	12	4	ON	F 5	64	10
3-25	19	12	4	ON	G 5	64	10
3-37	20	12	4	ON	A 5	64	11
3-49	21	12	4	ON	B 5	64	12
3-61	22	12	4	ON	C 6	64	12
4-37	23	72		DE			

Now we would use the SET VELOCITY with SELECTION CRITERIA. Use the value 127 for SET VELOCITY. Then select SCALE. Leaving the default values at 1 and 23 (the length of the sequence), we would get the following result:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	4	ON	C 3	64	10
1-13	2	12	4	ON	D 3	67	10
1-25	3	12	4	ON	E 3	70	12
1-37	4	12	4	ON	F 3	73	10
1-49	5	12	4	ON	G 3	75	10
1-61	6	12	4	ON	A 3	78	10

1-73	7	12	4	ON	B	3	81	12
1-85	8	12	4	ON	C	4	84	10
2-1	9	12	4	ON	D	4	87	10
2-13	10	12	4	ON	E	4	90	11
2-25	11	12	4	ON	F	4	93	12
2-37	12	12	4	ON	G	4	96	10
2-49	13	12	4	ON	A	4	98	12
2-61	14	12	4	ON	B	4	101	10
2-73	15	12	4	ON	C	5	104	10
2-85	16	12	4	ON	D	5	107	10
3-1	17	12	4	ON	E	5	110	12
3-13	18	12	4	ON	F	5	113	10
3-25	19	12	4	ON	G	5	116	10
3-37	20	12	4	ON	A	5	118	11
3-49	21	12	4	ON	B	5	121	12
3-61	22	12	4	ON	C	6	124	12
4-37	23	72	DE					

SCALE RESULT will not work with AUTO CHANNEL ASSIGN, MATCH MIDI CHANNEL or PERMUTE EVENTS. The computations involved take a fair amount of time, so be prepared to wait if you are processing a long sequence.

After the above options have been computed, you are returned back to the EDIT mode. You may continue EDITING operations or return to the main menu by pressing the F1 key.

4. COPY/APPEND

The COPY/APPEND command makes a copy of an existing sequence or appends one sequence to the end of a 2nd sequence.

After you select the COPY/APPEND option, the program will prompt with ENTER SOURCE: then ENTER TARGET: Respond to the ENTER SOURCE prompt with the key of the sequence that you wish to copy or append. To make a copy of the sequence, respond to the ENTER TARGET prompt with an unused sequence key. To append the sequence, respond with a key containing data.

The source sequence will not be changed by this operation. The target sequence will consist of its original data, followed by a copy of the source sequence. You can double the length of a sequence by appending it to itself.

When Copying a sequence, you must ascertain that the TARGET sequence is empty. The program will not tell you if the TARGET is empty or contains data.

5. MERGE SEQUENCES

The MERGE SEQUENCE option will combine two sequences into a single sequence. The program will ask for a SOURCE and TARGET, and then 'blend' the source sequence into the target sequence. The results will sound as if the two original sequences were started at the same time. The source sequence will not be changed.

6. OVERDUB

The OVERDUB option is used to record a sequence in sync with a previously recorded sequence, similar to overdubbing on a multi-track tape deck. OVERDUB will automaticallly set the new sequence length to equal the original sequence length. The sequences may later be merged, or started together from a control sequence.

The program will issue the prompt ENTER SEQUENCE TO OVERDUB: Respond with the key of the sequence that you wish to record in sync with. The program will next prompt ENTER SEQUENCE TO STORE OVERDUB: Respond with the key of an empty sequence.

The real-time record options screen will appear, as described under RECORD. You may turn on any additional sequence keys you wish to hear by pressing the appropriate sequence keys. The sequence that you are OVERDUBBING to will start as soon as you play the KBD or press the F7 key. If you are using a drumbox to provide EXTERNAL CLOCK, be sure to start it as well.

To begin the OVERDUBBED sequence with silence, press F7. If you do not play any notes on the KBD, the sequence you are syncing to, will continue to repeat. When the end of the sequence you are syncing to is reached, and you have played the KBD, the original and the new sequence will play back.

The FUNCTION keys operate as described in RECORD.

7. DISK FUNCTIONS MENU

All disk operations in the C128 KCS are performed from the DISK FUNCTIONS MENU, reached by selecting option 7 from the program's main menu. Selecting this option brings up the following screen:

```
DISK FUNCTIONS
1.  DIRECTORY
2.  LOAD C64 FILE
3.  LOAD SINGLE SEQUENCE
4.  LOAD ALL SEQUENCES
5.  LOAD ENVIRONMENT
6.  SAVE C64 FILE
7.  SAVE SINGLE SEQUENCE
8.  SAVE ALL SEQUENCES
9.  SAVE ENVIRONMENT
I.  INITIALIZE DISK
S.  SCRATCH A FILE
ENTER OPTION:


     ABOUT nnn SECTORS REQUIRED FOR COMPLETE SAVE
```

After a disk operation you are returned to the DISK menu. To exit back to the MAIN MENU press (RETURN).

The C128 version ofthe KCS can load and save four different kinds of data files.

A SINGLE SEQUENCE files contains the data from a single sequence. The only way to combine data from two C64 files or ALL SEQUENCE files is by saving sequences from one file as single sequence files, loading the second file, and loading the single sequence files one at a time.

ALL SEQUENCE files contain all sequence data in the program at the time they were saved. They also contain text data created with the EDIT TEXT option. Note that ALL sequence files CANNOT be read by the C64 KCS. SINGLE sequence and C64 files saved by the C128 KCS CAN be read by the C64 program, but the new ST, XX and KY events will not be correctly interpreted. If for some reason, you are creating files to play on a C64, you should edit the ST, XX, and KY events out.

ENVIRONMENT files contain the 'WORKING ENVIRONMENT' as of the time they are saved. This includes things such as clock source and rate, step-time and real-time transpose settings, the number of lines of text displayed on the play screen, and the last values used for some of the specialized edit options.

FILE NAMES AND FORMATS

All files created by the KCS have prefixes supplied by the program. C64 files have the prefix SQALL., SINGLE sequence files have the prefix SQ., SAVE ALL SEQUENCES files have the prefix S128., and ENVIRONMENT files have the prefix ENV. If you save more than about 1700 notes in an ALL sequence file, TWO files will be created, an S128 file and a file with the prefix PA61.

The formats for ALL sequence files, C64 and SINGLE sequence files are listed in the APPENDIX.

USING 1571 and 1541 DISK DRIVES

The program will use either the 1571 or 1541 disk drive. The 1571 is a faster drive and uses both sides of the disk. The 1541 will only use one side of the disk. You should not attempt to INITIALIZE single sided disks with the KCS'S INITIALIZE command. It will try to use both sides of the disk, this may or may not work all the time.

If you have some SS disks and wish to use them, it would be better to initialize them from the Commodore DOS (in the C64 mode) and then use them with the KCS. A single sided disk formatted under C64 DOS will contain information in its Directory that it is one sided, so the KCS won't attempt to use the other side.

1. DIRECTORY

The DIRECTORY command will list all files on the disk and display the amount of disk space left. Sequences currently in memory will remain intact. Use the NO SCROLL key to halt the display listing and press (RETURN) to return back to the DISK FUNCTIONS MENU.

LOADING FILES

If you select a LOAD option, the program will again ask ENTER FILE NAME:, and default to the last name used. When loading files, you do not have to specify the prefix that is listed in the directory. If the requested file is not found or a disk error occurs, the program will issue an error message.

2. LOAD C64 FILE

Use this option to load files saved with the C64 KCS sequencer. The file will look the same as a 128 file, except only the first 35 sequences will have data in them.

3. LOAD SINGLE SEQUENCE

When you LOAD A SINGLE SEQUENCE, the program prompts ENTER FILE NAME: Specify the exact name that was used when you SAVED the SINGLE SEQUENCE. The program next prompts ENTER SEQUENCE KEY OR NUMBER: This must be an unused Sequence key or number (it may be a secondary sequence); it does not have to be the same key that was used when you saved it.

If you attempt to assign a Sequence to a key or number that is already being used the computer will respond INVALID ENTRY. YOU CAN ONLY LOAD A SINGLE SEQUENCE INTO AN EMPTY KEY. You cannot load a SINGLE SEQUENCE unless you have previously saved it as a SINGLE SEQUENCE.

4. LOAD ALL SEQUENCES

Normally used when working with 128 song files. When you LOAD ALL SEQUENCES, anything currently in memory is erased and the Sequences on disk are loaded into the bottom of memory, leaving a single chain of free space at the top.

If you load ALL sequences and the program needs a PA61 file which is not on the original disk, the program will ask if it is on another disk and allow you to load from one if desired.

5. LOAD ENVIRONMENT

This option will retrieve an environment saved from a previous session. Since the working environment contains initialization parameters, you can use this option to bypass the INITIALIZATION proccess when booting up.

SAVING A FILE

You should save data whenever you make substantial changes. It is also wise to make backups of important files on a separate disk.

A file name can be any combination of ten characters. The program will truncate the file name to ten characters if you should assign more. When you SAVE ALL SEQUENCES, you also save Sequence names and alternate key assignments.

When you choose one of the SAVE options on the menu, the program will issue the prompt ENTER FILE NAME: The default file name will be the one last used by the program. You should not enter the prefix, as the program will supply it.

If a file with the same name and type as the one being saved already exists on disk, the program will ask FILE EXISTS, REPLACE?, and return you to the DISK FUNCTIONS menu if you answer no (any key except Y).

If an error occurs during disk IO (no disk present or drive door open), the program will issue a message and return to the disk menu.

6. SAVE C64 FILE

This option will create files which are identical to files created with SAVE ALL SEQUENCES in the C64 program. Saving a C64 file will save all data from the PRIMARY sequences, but will not save any secondary sequences or text data. If you are creating a file that you wish to use with the C64 program or a patch librarian or utility that reads C64 files, DO NOT use any secondary sequences.

7. SAVE SINGLE SEQUENCE

When you save a SINGLE SEQUENCE, the program prompts ENTER FILE NAME: Enter any name you choose, followed by (RETURN) This name does not have to be the name you may have given it during edit. The program will then prompt ENTER SEQUENCE KEY OR NUMBER: Reply by pressing the key of the Sequence that you wish to save, and (RETURN).

The program will issue an error message if the sequence does not exist.

8. SAVE ALL SEQUENCES

When saving ALL sequences, the program will save the S128 file, and, if necessary because of length, a second file called a PA61 file. If the PA61 file cannot be saved on the same disk as the S128 file, you may abort the operation or the program will prompt you to continue on a different disk. The bottom of the DISK FONCTIONS MENU tells you approximately the number of sectors needed for a save. You can save time and be sure to save all your data on the same disk by using the directory option to make sure there is enough room before saving.

9. SAVE ENVIROMENT

Use this option to save working parameters set up in the 128. By saving an ENVIRONMENT and loading it back on later sessions, you can bypass the INITIALIZATION process.

I. INITIALIZE DISK

INITIALIZE DISK should be used when you need to format a disk to store files on. The program prompts ALL DATA ON DISK WILL BE ERASED. ARE YOU SURE? Answering with a Y will format the disk, any other key will return to the DISK FUNCTIONS MENU. Make sure you use a Double Sided blank disk, or a disk containing data no longer needed.

CAUTION: If you initialize a single sided disk while the computer is in C128 mode, the program will attempt to save data on BOTH sides of the disk. This will work sometimes, but is VERY RISKY and not recommended. In any case, WE STRONGLY RECOMMEND that you save frequently DURING your session.

S. SCRATCH A FILE

SCRATCHING a file will remove it permanently from the disk. You must specify the full file name, prefix included, as a precaution. For example to delete a 128 sequence file called, BADSONG, enter after the filename prompt: S128.BADSONG

To delete an ENVIRONMENT saved as BLUESCALE, enter after the prompt:
ENV.BLUESCALE

Use the DIRECTORY option to get the exact spelling of a file name.

EXIT the DISK FUNCTIONS menu by pressing (RETURN).

8. OTHER OPTIONS

Select option 8 to access MENU 2 which contains additional commands.

MENU 2

MENU 2 contains nine options. After completion of any MENU 2 option, the MAIN MENU will be displayed. You can also return to the MAIN MENU by pressing any other key on the computer KBD. MENU 2 options are:

1. DISPLAY SEQUENCE MAP
2. CHANGE STEPS/MEASURE
3. DEFINE NEW KEY ASSIGNMENT
4. CHANGE CLOCK
5. DELETE SEQUENCE
6. RETURN TO INITIALIZATION
7. EDIT TEXT
8. MIDI THRU OFF
9. COUNTIN 0

1. DISPLAY SEQUENCE MAP

The DISPLAY SEQUENCE MAP option shows how the Sequencer memory is currently being used. When this option is selected, the program will ask if you want a hard copy. The program displays a list the similar to the following:

SEQUENCE DEFINITIONS

KEY	START	END	TIMES	NAME
1	1	98	99	BELLS
2	99	232	99	STRINGS
3	233	299	8	HEAVEN
4	300	430	99	VBRIFF
5	431	448	99	PERC
7	449	501	16	WOODRUM
C	502	679	99	ORCHS.2
E	680	1065	99	WOODRUM2
S	1066	1098	1	SONG
W	1099	1227	99	COPYOF3
X	1228	1235	1	PRESETS
Y	1236	1252	1	SONGPRGS

10748 EVENTS REMAINING

One entry appears for each Sequence currently in memory. KEY represents the computer key that will play that sequence START and END show where the sequence resides in memory. TIMES is the number of repeats a Sequence will play, when activated from the computer KBD. If a NAME was assigned during EDIT it will be listed under the NAME column. The number of events remaining is also displayed.

Press any key to return to the MAIN MENU.

2. CHANGE STEPS/MEASURE

Use the CHANGE STEPS/MEASURE to match the clock speed of various drum machines. Changing STEPS/MEASIRE affects the MST-ST listing, the note abbreviations used in TYPING FROM THE COMPUTER KBD, and the ALIGN feature. If you are changing the steps/measure to match the clock speed of a drum machine, you should also go back to INITIALIZATION and change the STEPS/BEAT option. The default STEPS/MEASURE value is 96 and the range is 1 - 255.

Changing STEPS/MEASURE does not directly affect the speed at which existing sequences are played back.

Changing the STEPS/MEASURE is useful for work in time signatures other than 4/4. Setting STEPS/MEASURE to 120 will give a correct measure readout and record alignment for a piece in 5/4 time.

3. DEFINE NEW KEY ASSIGNMENT

The DEFINE NEW KEY ASSIGNMENT feature assigns additional Sequence keys to play part or all of the data stored in an existing sequence, with transposes if desired. This allows you to have multiple copies of the same sequence playing at once (for delay or round effects), or variations of the same sequence assigned to different Sequence keys.

Each KEY ASSIGNMENT may be given a transpose in pitch, velocity, and duration, if desired. The key can be assigned to play part or all of the Sequence. The entered transpose values (except for duration) will be used only when the key is played from the computer keyboard.

Computer will PROMPT	USER enters
ENTER COMPUTER KEY:	any EMPTY Sequence Key
ENTER SEQUENCE KEY OR NUMBER:	Sequence you wish to COPY
REPEATS:	(RETURN) or any number 1 - 99
STARTING EVENT:	(RETURN) or any number > or = 1
ENDING EVENT:	(RETURN) or any number < or = end
KEY TRANSPOSE:	(RETURN) or any number -64 to 63
VELOCITY TRANSPOSE:	(RETURN) or any number -64 to 63
DURATION TRANSPOSE:	(RETURN) or any number -64 to 63

The REPEATS default to 1, the transposes to 0, and the STARTING AND ENDING EVENTS to the first and last events of the sequence played. If you specify a starting and/or ending event, the alternate key will only play the events in the range specified.

An alternate KEY ASSIGNMENT will not list if you try to EDIT it, but it will be displayed on the PLAY screen. If an ALT KEY is transposed and it calls another Sequence, the transpose will be passed on.

4. CHANGE CLOCK

CHANGE CLOCK is used to change the internal clock speed, or switch to an external clock for syncing purposes. Selection of this option brings up the following menu:

```
CLOCK OPTIONS:
0.   INTERNAL
1.   MIDI
2.   PULSE OR TAPE SYNC
3.   MIDI WITH SONG POINTER
CURRENT OPTION NUMBER:
ENTER OPTION:
```

After selection an option by pressing a key 0 - 3, the program will pause for one second and then go back to the MAIN MENU. Note that the status of all clock options is saved when you save the working ENVIRONMENT.

0. INTERNAL CLOCK

Selecting INTERNAL on the clock menu, will call a screen like the following:

```
CURRENT PARAMETERS
1.  MIDI CHANNEL                    1
2.  CC EVENT TYPE                   8
3.  CLOCK VALUE FOR CONTROLLER MIN  40
4.  CLOCK FOR CONTROLLER MAX        203
5.  CURRENT CLOCK                   123   CONTROL VALUE 106
6.  PRINT TIMING TABLE
CHANGE:
```

With the C128 KCS you can control the internal clock rate from any MIDI controller that generates CC (control change) events. Examples of such controllers are mod wheels, foot pedals and breath controllers. When the program is in PLAY mode, events of the selected MIDI channel and CC event type will change the internal clock rate when they are received over MIDI or played from within a sequence.

When you are in RECORD mode, such events will alter the clock rate AND be recorded, PROVIDED that you have turned on the NON-KEYBOARD option. You can thus overdub a gradual tempo change to an existing sequence. You may want to do this while echoing to an unused MIDI channel which will allow you to use this controller with your synth as well.

You may also specify the clock rate by entering a CC event of the specified channel and type into your sequence using the TYPE FROM COMPUTER KEYBOARD mode or the EDIT mode.

CHANGING CLOCK CONTROLLER OPTIONS

In the example shown, the program will make tempo changes in response to events of CC type 8 on MIDI channel 1. We deliberately chose an infrequently used controller to avoid possible confusion. You can change either MIDI channel or controller by selecting options 1 or 2 on the menu. Unless you own a KX76/88, you will probably want to use the mod wheel (CC type 1) or foot controller (CC type 4) as your CC type.

Lines 3 and 4 of the screen give the clock rate, in beats/minute, for the minimum and maximum values of the controller. Controller values can range from 0 to 127. You can change the range of tempos available by selecting option 3 or 4 from the screen. Note that changing either of these lines will change the clock rate produced by previously recorded MIDI tempo events.

Line 5 gives the current clock value, and the controller value needed to produce it. You can change the current clock value to any value you want. The program will then display the controller value needed to produce it from within a sequence.

If you have a printer, you can print a table of all possible controller values from 0 to 127, and the clock values that each will produce. For reference the table for the default range is given:

CONTROLLER VALUE TABLE - BEATS/MINUTE

C/V	B/M	C/V	B/M	C/V	B/M	C/V	B/M	C/V	B/M	C/V	B/M	C/V	B/M
0	40	16	44	32	50	48	58	64	69	80	85	96	109	112	153
1	40	17	45	33	51	49	59	65	70	81	86	97	110	113	158
2	40	18	45	34	51	50	59	66	71	82	87	98	113	114	161
3	40	19	46	35	52	51	60	67	71	83	88	99	116	115	166
4	41	20	46	36	52	52	61	68	72	84	89	100	117	116	169
5	41	21	46	37	53	53	61	69	73	85	91	101	120	117	175
6	41	22	47	38	53	54	62	70	74	86	92	102	123	118	181
7	42	23	47	39	53	55	63	71	75	87	94	103	124	119	184
8	42	24	47	40	54	56	63	72	76	88	96	104	128	120	192
9	42	25	48	41	55	57	64	73	77	89	96	105	129	121	199
10	43	26	48	42	55	58	64	74	78	90	98	106	133	122	203
11	43	27	48	43	56	59	65	75	79	91	100	107	136	123	212
12	43	28	49	44	56	60	66	76	80	92	101	108	138	124	221
13	43	29	49	45	57	61	67	77	81	93	104	109	142	125	226
14	44	30	50	46	57	62	67	78	82	94	105	110	146	126	237
15	44	31	50	47	58	63	68	79	83	95	107	111	149	127	243

the , key will increase clock speed during PLAY and
the . key will decrease clock speed.

USING MOD WHEEL TO CHANGE TEMPO

To use the Mod wheel on a DX7 to change the tempo you would do the following. Change the value of Option 2 - enter a 1 (for mod wheel). Next record a sequence making sure you have turned on NON KBD events. Select a sequence to play. As the sequence is playing move the modulation wheel - the sequence playing will change tempo and you will see the tempo display change status. Practise changing the tempo.

When you have the feel down, set the mod wheel back to the desired starting point and press F5 to start recording again. Press the sequence to play and the (SPACEBAR); move the mod wheel in the desired manner. When thru press F7. You can now check out what you recorded. Go into EDIT and list the sequence, it might look something like:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-96	1	95	1	CC	1	103	
2-20	2	20	1	CC	1	104	
2-22	3	2	1	CC	1	105	
2-49	4	27	1	CC	1	106	
2-57	5	8	1	CC	1	107	
2-63	6	6	1	CC	1	108	
2-88	7	25	1	CC	1	109	
3-35	8	43	1	CC	1	110	
3-41	9	6	1	CC	1	111	

3-64	10	23	1 CC	1	112
3-73	11	9	1 CC	1	113
4-8	12	31	1 CC	1	114
4-25	13	17	1 CC	1	115
7-1	14	264	1 CC	1	116

The last step is to put this tempo control sequence into a song or have it called up by some other sequence.

The other CHANGE CLOCK options are:

1. MIDI clock. The program will expect a MIDI START or CONTINUE command before it starts responding to the clock. Bear in mind that the KCS has one MIDI input. If you WISH TO RECORD and USE A MIDI CLOCK, you must MERGE the clock and note information together.

2. PULSE works only with the Sequential or Model T interface. TAPE SYNC works only on those Passport and Syntech interfaces that have tape in and out jacks on the left. The TAPE SYNC option should be selected only AFTER a sync tone has been recorded. See the appendix USING THE SYNC-TO-TAPE FUNCTION for more details.

3. MIDI WITH SONG POINTER When this option is selected, the program will prompt SELECT SONG: Enter a PRIMARY sequence key to serve as the current song for song pointer events. When the program receives a MIDI SONG POINTER message during record or play, it will then turn off all active sequences, start the current song sequence, and 'chase' through it as rapidly as possible (about 2800 events/second) until the specified point in the song is reached. The only MIDI events that will be sent during this time are program changes.

After the CHANGE CLOCK option has been selected, the program will pause for one second and then return to the MAIN MENU.

5. DELETE SEQUENCE

DELETE SEQUENCE erases whatever sequence key or number you specify. The program will ask ARE YOU SURE? Press Y to confirm or any other key to escape back to the MAIN MENU.

6. RETURN TO INITIALIZATION

RETURN TO INITIALIZATION lets you reset clock functions, step-time entry options, real-time transpose functions, and general options. The program will prompt you to insert the program disk before proceeding. You may return to the INITIALIZATION section without disturbing Sequence memory.

7. EDIT TEXT

This option allows you to enter up to ten lines of text that can be printed in hard copy and will be stored with your sequence data. The program will display the top five lines on the play screen. You can use the initialization section of the program to change the number of lines displayed. The top line of text is initialized to dashes to provide visual separation on the play screen.

When you select this option, the program will display all existing text and put the cursor in the text area. You can change any line of text by typing over it and pressing return. Exit this mode by starting a line with X or F1. The program will ask if you want a hard copy of the text when you exit.

The program uses the Commodore BASIC line editor. Do not use commas, or colons in your text. Be careful about pressing only alpha-numeric keys (no control or ESC keys). Text lines may be erased or duplicated. If this happens re-enter the EDIT TEXT mode again and retype. Nothing else in the program will be affected.

8. MIDI THRU

The PLAY screen will display the current status of the MIDI THRU feature. MIDI THRU is toggled on/off by selecting option 8. When MIDI THRU is on, the program will merge all incoming MIDI data, except for system exclusive, into the data stream sent out by the sequencer. MIDI THRU only functions when the program is in RECORD or PLAY.

9. COUNTIN

The program allows you to specify a COUNTIN of up to 255 time steps (1 step = 1/24 quarter note). This countin gives you some 'free' counts of the metronome or drum machine before recording or overdubbing. To set a 2 measure countin set option 9 to 192.

Note that steps/measure, clock status, MIDI THRU status and COUNTIN are all saved in ENVIRONMENT FILES.

The KEYBOARD CONTROLLED SEQUENCER utilizes several ways to enter and manipulate note information. Its design is in some ways similar to that of a large modular synth. When you first start using the KCS, learn the basic operations, and as you become more familiar with the program, experiment with the Algorithmic edit and selection criteria.

WHY ALGORITHMIC EDIT OPTIONS AND SELECTION CRITERIA

A personal essay by Dr. T

It was with much excitement and some apprehension that I began work on the ALGORITHMIC EDIT OPTIONS and SELECTION CRITERIA. I was excited because I knew that these features would add new dimensions of power and control to the KCS. I was apprehensive because some users and potential users complained that the KCS was already 'too hard' for a musician to learn. Here I was about to add a great many new features, some quite abstract, and few having obvious applications to making popular music.

I decided to add these features in a way that would not require anyone who didn't want to use them to learn them at all. In fact, I suggest that if you do want to use them, you learn them one or two at a time, as you get curious about them or find uses for them in your music. Note of the features INDIVIDUALLY are all that complex.

I am writing this essay to explain WHY I added these features, and to suggest ways in which they can be used in conventional music making. I am an intuitive, untrained musician; neither my hands nor my ears are capable of great precision. The KCS was written in part to provide a set of tools that would help me, and people like me, make interesting, coherant, structured music. It allows one to set up ones own rules of musicial structure, and to modify or work within them as one chooses. The algorithmic edit and selection features are an extension of this process.

Computers are very good at processing lists of data. If we treat a sequence as a list of data, we can think of a great many ways in which we could process it. Some are musically obvious, like pitch transpose, or auto-correction. Others are less obvious, like inverting pitch, or increasing or decreasing the dynamic range of a passage. Some are not obvious at all, like permuting two notes, or doing something (delete, transpose, etc.) to every THIRD note in a passage.

The algorithmic edit and selection critearia features are a toolkit of such possiblities. I have tried to make this toolkit function as generally as possible, hopefully without making the individual tools too hard to use.

SUGGESTED APPLICATIONS

Last year a customer called and said that he had a keyboard part that he had recorded with both hands on one MIDI channel. He wanted to 'split' the part, and, with the C64 KCS, he had to change the channel of each note separately. He suggested that I provide a 'keyboard split' mode, in which an edit process could be applied to one half of the keybaord and not the other. Many of the selection criteria came out of this conversation. A keyboard part can be 'split' over two channels by using the AUTO CHANNEL ASSIGN transpose function with the RANGE OF PITCHES selection criterion. Notes in the selected range of pitches will be

moved to the new MIDI channel.

We can use different selection criteria to change the channel of notes with a selected dynamic range, in certain positions on the chromatic scale, with selected timing, by position in the event list (EVERY N'TH NOTE), or even probabilistically. Much contemporary pop music is based on simple repetitive patterns. It seems to me that such music can be made more interesting by making subtle, perhaps barely perceptable, changes in the repetitive pattern. Copy the pattern to itself, and perhaps use some of the selection criteria to slightly alter the dynamics of some of the notes. If you are using multi-timbral instruments and have an extra voice handy, create two ALMOST identical patches, and use the selection criteria to divide a line over the two slightly different voices. Use the ADD SEQUENCE START EVENT option to double certain notes on a voice with much lower volume. The possiblities are endless!

DRUM 'HITS' AND DOUBLING

One way to add interest to a pattern is to create drum 'hits' in which selected pitches in the pattern are doubled on a specific drum in a MIDI drum machine. One way to do this is to copy the sequence, DELETE IN PLACE all notes that you DON'T want doubled, selecting by POSITION ON CHROMATIC SCALE, and use the AUTO CHANNEL ASSIGN and SET PITCH options to cause the remaining pitches to be played on the desired drum. Merge the new sequence in with the old, or add it to the control sequence that plays the song.

Another way to create drum 'hits' is to create a one note sequence that plays the drum, and use the ADD SEQUENCE START EVENTS option to add a sequence start event for this sequence after each note that you want the drum hit for. You can also use this technique to double selected notes on another synth. If you create a short sequence with descending velocities, you can also create 'echo' effects with selected notes.

The ADD SEQUENCE START EVENTS option can also be used to add a specific pitch bend or control change sequence to ALL notes that meet your selection criteria. Record a short sequence that contains an interesting pitch bend or control change effect, and use the ADD SEQUENCE START EVENTS option to play it after each note desired.

You can use the WITH SELECTED PROBABILITY selection criterion or the PERMUTE EVENTS option to add a little randomness. You can use the RESCALE VELOCITIES or SET VELOCITY option along with the SCALE RESULT selection criterion to create crescendos or decrescendos. Have fun!!

ALTERNATE TUNINGS

Most MIDI instruments are designed to play only equally tempered scales with 12 notes to the octave. This is a serious limitation for many musicians. I can't do much about the 12 tones, but you CAN use the KCS to get around some of the limitations of equal temperment.

If you have a monophonic part, you can create a new scale with arbitrary tuning by creating a one event sequence for each note in the scale. This event will be a pitch bend that tunes the note to the desired pitch. Then, use the ADD SEQUENCE START EVENT option with selection BY POSITION ON CHROMATIC SCALE to add

the sequence start events that will retune the synth immediately after each note is played.

A simpler method, and one that can be used polyphonically, is to use multiple synths, or multiple voices of multi-timbral synths, with each voice identical except for tuning. With the AUTO CHANNEL ASSIGN OPTION and selection BY POSITION ON CHROMATIC SCALE, you can assign notes of each pitch to the desired synth voice. If you are using multi-timbral synths to do chordal parts here, you will have to be careful about running out of voices. This technique can also be used to create the MIDI equivalent of a prepared piano, in which some notes sound with a somewhat (or radically) different timbre than others.

In conclusion, these features open up a gamut of possiblities for music making. If you approach them with an open mind, you can't help but find some good ideas. They are not intended to replace the guy sitting down with a keyboard or a guitar, writing a song and working out an arrangement, but instead to create new possiblities for people to use making music!

KBD SPLITTING A SEQUENCE

You may at sometime want to take a sequence and assign the note information to two different MIDI channels, so that the left hand could sound as a bass and the right a piano etc. You can use the TRANSPOSE edit operation AUTO CHANNEL ASSIGN with Selective Criteria RANGE of PITCHES to accomplish this. Below is a scale:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	4	ON	C 3	91	11
1-13	2	12	4	ON	D 3	76	12
1-25	3	12	4	ON	E 3	74	12
1-37	4	12	4	ON	F 3	77	10
1-49	5	12	4	ON	G 3	80	11
1-61	6	12	4	ON	A 3	79	10
1-73	7	12	4	ON	B 3	84	12
1-85	8	12	4	ON	C 4	86	10
2-1	9	12	4	ON	D 4	76	12
2-13	10	12	4	ON	E 4	74	12
2-25	11	12	4	ON	F 4	77	10
2-37	12	12	4	ON	G 4	80	11
2-49	13	12	4	ON	A $	79	10
2-61	14	12	4	ON	B 4	84	12
2-73	15	12	4	ON	C 5	86	10
2-85	16	12	4	ON	D 5	76	12
3-1	17	12		DE			

To edit press TF1. Select AUTO CHANNEL ASSIGN - the program will prompt for a range of MIDI channels. Enter the same value for both parameters. For the SELECTION CRITERIA - enter RANGE OF PITCHES.

Lets edit the second option, so press E2. The program will prompt you for RANGE START and RANGE STOP. For RANGE START enter the key where you want the split to begin, let's say C4. For the RANGE END C6. Press (RETURN) and Y for ARE YOU SURE? List your sequence, it will look like:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	4	ON	C 3	91	11
1-13	2	12	4	ON	D 3	76	12
1-25	3	12	4	ON	E 3	74	12
1-37	4	12	4	ON	F 3	77	10
1-49	5	12	4	ON	G 3	80	11
1-61	6	12	4	ON	A 3	79	10
1-73	7	12	4	ON	B 3	84	12
1-85	8	12	1	ON	C 4	86	10
2-1	9	12	1	ON	D 4	76	12
2-13	10	12	1	ON	E 4	74	12
2-25	11	12	1	ON	F 4	77	10
2-37	12	12	1	ON	G 4	80	11
2-49	13	12	1	ON	A $	79	10
2-61	14	12	1	ON	B 4	84	12
2-73	15	12	1	ON	C 5	86	10
2-85	16	12	1	ON	D 5	76	12
3-1	17	12		DE			

You can now use the SWITCH MIDI CHANNEL command if you want the split point to go to a different MIDI channel. You could use this technique to create several zones in a sequence by repeatedly doing the same operation with a different range of pitches each time.

COPYING A SEQUENCE WITHOUT GOING OUT OF EDIT

If you want to make several copies of a sequence and you are using shell structures, you can use the (G)et and (B)ACKUP command to your advantage to copy a sequence without going out of EDIT.

First you must already have sequences in advance which consist of only a 'DE' event with a time of '0' (the SHELL4 file will have these). You can create these sequences by entering the RECORD - TYPE FROM COMPUTER mode. Enter a time value of 0 and make the note type be a 'DE' event. These are basically 'empty' sequences. If the program attempts to play these sequences, all that will happen is you may notice them flicker on the PLAY screen and control will pass on to the next sequence. One advantage an 'empty' sequence is that it can be named before it is used. Then they will be displayed when you are in PLAY. You might make a little code to show yourself they are empty with names like "-BASS2" or "-IPIANO" etc. After they are recorded you can change the name again.

Say you want to copy Sequence 3 which is a four measure riff to Sequence A which is an already defined 'empty' sequence. To copy Sequence 3, select EDIT and key 3. Now make a BACKUP of Sequence 3 (which is stored in Sequence Y) and then press ZA which will let you edit Sequence A.

At this point listing A will reveal a DE event with a time of 0. Now do a (G)ET BACKUP. Sequence A will now contain what was previously in sequence Y (the back up sequence). If you want to make yet another copy, (B)ACKUP the sequence again and move to another empty sequence and repeat the process.

Remember that (B)ACKUP makes a copy of the sequence currently being edited and stores it in sequence Y and (6)ETBACKUP exchanges the Y sequence with the sequence you are currently editing.

DOUBLING SEQUENCE PARTS

You can create thicker parts by copying a Sequence to another key, transposing and deleting certain notes, or doing some permutations on the velocity and then assigning this Sequence to a different instrument.

CONTROL SEQUENCES

One Sequence can start another Sequence. Do this by entering a Sequence key (SEQUENCE START EVENT) under the TYP column. You do not need to specify a MIDI channel. This Sequence may be transposed in pitch from -64 to 63 half-steps by entering a value under the NOTE column. If the original Sequence was also transposed, the two transpose values will be added together.

The value under VEL represents the number of velocity units that the Sequence is to be transposed. This allows you to vary the dynamics of a Sequence by starting it from another Sequence.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		A	2	8	1
2-1	2	96		1	-24	-10	1
	3	-					

In this example Sequence key A's pitch is transposed two half- steps up and it's velocity is eight units faster than originally defined. Ninety-six clock counts later (1 measure) Sequence key 1 is called. It is transposed one octave lower and its velocity has been decreased by 10 units.

The value under DUR is the number of times a Sequence will be played. This is the number or times the Sequence will repeat and it overrides the original repeat value that was set up. When a W is beside the DUR value, this tells the program to WAIT for the current Sequence to finish playing before continuing with any new vents in the list. The DUR number may be from 1 - 99, with 99 indicating to keep playing the current Sequence indefinitely until the PLAY mode is ended.

Pressing the FOOTSWITCH or F7 during PLAY will cancel repeats for any numbered Sequences (1 - 9) that are currently playing. Pressing the Sequence key of any Sequence currently playing will cancel its repeats.

SONG MODE (NESTING CONTROL SEQUENCES)

You can easily build SONGS or CHAIN Sequences together. In the example below Sequence S chains Sequences A, B, C, 7, and 8, while Sequences A, B, and C play Sequences 1 - 6 in different combinations.

KEY	NAME	CONTAINS
1	VBASS	Bass part for verse
2	VPIANO	Piano part for verse
3	VSTRING	Strings for verse
4	V2STRING	Alternate strings for verse
5	CBASS	Bass for chorus
6	CPIANO	Piano for chorus
7	BBARK	Barking dog bridge
8	END	Big ending
A	CALL V	plays Sequences 1, 2, 3
B	CALL V2	plays Sequences 1, 2, 4
C	CALL C	plays Sequences 5, 6
S	PLAYSONG	plays Sequences A, B, C, 7, 8 using REPEAT and WAIT

The event list for Sequence S would look something like:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		A	0	0	2 W
1-1	2	0		C	0	0	1 W
1-1	3	0		B	0	0	2 W
1-1	4	0		C	0	0	1 W
1-1	5	0		7	0	0	1 W
1-1	6	0		A	0	0	2 W
1-1	7	0		C	0	0	1 W
1-1	8	0		8	0	0	1 W
1-1	9	0		DE			

A structure like this lets you go back and re-record Sequence 1 without rewriting the song. Or you could EDIT Sequence C to call another Sequence in addition to what it is presently doing. Another application of this feature would involve programming a series of control events, such as pitchbends and storing them in another Sequence. This Control Sequence could then be started by any of the Calling Sequences such as A B or C.

USING THE SHELL4 FILE TO CREATE A SONG

The program disk may contain a file called SHELL8 or a file called SHELL4. SHELL files define the structure of a song before you begin recording it. Of course, it can easily be modified as you go along. After becoming familiar with the principles described here, you may wish to create a number of different shells depending on what type of music you are working on.

A SHELL file can create a SONG without you having to create control sequences. They are already 'pre-defined'. SHELLS are very useful if you are working on a song with a defined structure (intro, verse, chorus, verse, chorus, bridge, chorus, etc.).

The following is an explanation of the SHELL4 file. The SHELL8 file is the same except that it has 8 control sequences. Check which file is on you disk, and load it in. To load the SHELL4 file, select LOAD ALL SEQUENCES option on the disk menu, and enter SHELL4 when the program asks for a file name.

After the file has been loaded, Press (RETURN) for the main menu and then option select option 1 - PLAY. The display should look like:

```
 S RE NAME     P F W S RE NAME     P F W S RE NAME     P F W S RE NAME     P F W
- -- -------- - - - - -- -------- - - - - -- -------- - - - - -- -------- - - -
1 1  VERSE         .2 1  CHORUS        .3 1  BRIDGE        .4 1  BREAK
                   .                   .                   .
                   .                   .                   .
                   .                   .                   .
                   .                   .                   .
                   .                   .                   .
                   .                   .                   .S 1  SONG
T 1  STOPNOTE      .                   .                   .
X 1  PRESETS       .Y 1  BACKUP        .Z 1  X             .
01                 .02                 .03                 .04
05                 .06                 .07                 .08
09                 .10                 .11                 .12
13                 .14                 .15                 .16
17                 .18                 .19                 .20
21                 .22                 .23                 .24
SHELL4-----------------------------------TEMPO--------------DATE
1=                  2=                  3=                  4=
5=                  6=                  7=                  8=
9=                 10=                 11=                 12=
13=                14=                 15=                 16=
CLOCK:   123 BEATS/MINUTE   MEASURE            RT SEQS 12          F1 TO EXIT
```

This shell has set up five lines of text to be displayed. You will most likely want to alter it to suit your particular needs. You may also want to alter the number of control sequences and save them as variations. Then you can load a different shell depending on what type of music you will be working on.

Shell4 contains five control sequences. Sequence S (song) which in turn, calls up sequences 1 - 4. Looking at the event list for sequence S will show:

```
MSR-ST  EVNT  TIME CH TYP NOTE VEL DUR
------- ---- ----- -- --- ---- --- ---
  1-1    1    0        1  0      0 1 W
  1-1    2    0        2  0      0 1 W
  1-1    3    0        1  0      0 1 W
  1-1    4    0        2  0      0 1 W
  1-1    5    0        3  0      0 1 W
  1-1    6    0        1  0      0 1 W
  1-1    7    0        2  0      0 1 W
  1-1    8    0        DE
```

Sequence S starts sequence 1, waits for it to finish, then starts sequence 2, waits for it to finish, then plays sequence 1 again, etc. Listing sequence 1 whould show:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		ST	01	0	1
1-1	2	0		ST	05	0	1
1-1	3	0		ST	09	0	1
1-1	4	0		ST	13	0	1
1-1	5	0		ST	17	0	1
1-1	6	0		ST	21	0	1W
1-1	7	0		DE			

Sequence 1 will start SECONDARY sequences 01, 05, 09, 13, 17, and 21 all at once. Nothing will happen if any of these sequences haven't been recorded yet. Sequence 1 will wait until sequence 21 is thru playing before returning control to sequence S. Always leave a DE event at the end of sequences. Control sequences will not operate correctly if they are ommitted.

Sequences 2 - 4 when listed will call the SECONDARY sequences in their respective columns. The decision of which sequences are called is arbitrary. Placing them in one column may work fine for you, or you may discover a better method. You may change and add sequences to be called as needed.

STARTING THE SONG

We will record sequence 21 first because sequence 1 WAITS for that to finish. Let's make it a bass part. Once that is done, we can play it back pressing sequence 1. We can now add 5 more parts. Select OVERDUB and select sequence 1 when the program asks ENTER SEQUENCE TO OVERDUB TO. When the program asks ENTER SEQUENCE TO STORE OVERDUB, select sequence 01. The program will then play sequence 21 and record part 01. We can continue the proccess until the 6 tracks are filled.

Any additional number of sequences may also be added to sequence 1 if desired. Remember to add them before the last control event of the sequence. If a part is half as long as the last control event and is to be repeated, make sure to change the $ under the REPEAT column.

We can next move on and start working on the CHORUS section, sequence 2. We would do this in a similar manner starting with sequence 22 etc. The song may be built up in any order you like. You can record alternate parts and choose the best one, or edit them together into one sequence!

The only restriction when using shell structures is that a CONTROL sequence must have it last sequence recorded (the one with a W) if you want the sequence to play correctly. The program will skip over ST calls to empty sequences. A CONTROL sequence will be skipped over also if all its sequences are empty.

You should check the length of sequences in a control sequence to make sure they all end at the same time as the sequence with the WAIT ends. One sequence may have to repeat two or four times to another sequence's one time.

When you have built up the control sequences sufficiently, you can play the Song sequence. You can develop your own technique to creating songs. One way might be to record the basic chords changes first for each section, then go back and

fill in bass, melody, etc. or you might desire to completely finish one section before starting another. It's all up to you.

AUTOMATIC CONTROL SEQUENCE UPDATE

AUTOMATIC CONTROL SEQUENCE UPDATE is an alternative to using shell structures. With AUTOMATIC CONTROL SEQUENCE UPDATE, you can create control sequences as you record a piece. This is useful if you are not sure what the structure of a song will be.

AUTOMATIC CONTROL SEQUENCE UPDATE is not active when the program is booted up. It must be turned on and off from the INTITIALIZATION SECTION. It will also be activated if you load an ENVIRONMENT file which specified UPDATE at the time it was saved.

After you create a new sequence with this feature active, the program will ask DO YOU WANT TO CREATE OR ADD TO CONTROL SEQUENCE? If you answer this question with a Y, the program will then ask you to enter the key or number of the control sequence desired. If you specify a sequence that is not in use, the program will create a new sequence. This sequence will contain two events. The first will be an ST event calling the newly recorded sequence with one repeat and a wait. The second event will be a DE event. (remember when you create a control sequence manually to end with a DE event.)

If you specify a sequence that already exists, the program will insert an ST event (without a wait) at the BEGINNING of the selected sequence. It will have a repeat value of 1. This CONTROL sequence will now call your newly recorded sequence whenever it is itself started.

If you were OVERDUBBING, or recording with CUE or SONG POINTER, and you answer the CREATE OR ADD TO CONTROL SEQUENCE question yes, the program will assume that you want to add to the overdub, cue or song pointer sequence.

You can use this feature to automatically build a control sequence that will play as many overdubs as needed simultaneously. Simply create the control sequence you want when you record the first part, and specify the same control sequence on each overdub.

This feature combined with the RECORD WITH CUEING feature make it easy to add a new part any any point in an existing song. Do a RECORD WITH CUEING, starting the song a few bars before the point at which you wish to begin recording, and answer the CREATE OR ADD TO question yes.

SEQUENCE LAYOUT

When using AUTOMATIC CONTROL SEQUENCE UPDATE you may find the following layout of the sequences helpful when deciding which sequences to record next. When the program is initialized to display 0 lines of text, 84 sequences may be displayed on the play screen (Primary sequences 1 - Z and Secondary sequences 00 - 48).

S	RE	NAME	P	F	W	S	RE	NAME	P	F	W	S	RE	NAME	P	F	W	S	RE	NAME	P	F	W
1							.2						.3						.4				
5							.6						.7						.8				
9							.A						.B						.C				
D							.E						.F						.6				
H							.I						.J						.K				
L							.M						.N						.O				
P							.Q						.R						.S				
T							.U						.V						.W				
X							.Y						.Z						.00				
01							.02						.03						.04				
05							.06						.07						.08				
09							.10						.11						.12				
13							.14						.15						.16				
17							.18						.19						.20				
21							.22						.23						.24				
25							.26						.27						.28				
29							.30						.31						.32				
33							.34						.35						.36				
37							.38						.39						.40				
41							.42						.43						.44				
45							.46						.47						.48				

CLOCK: 123 BEATS/MINUTE MEASURE RT SEQS 12 F1 TO EXIT

PUNCH-IN AND PUNCH-OUT

If you've recorded a sequence that you want to keep most of and just change a part, try the following. Use ALGORITHMIC EDIT option DELETE 'IN PLACE' to get rid of any wrong notes. Next record an OVERDUB sequence; use RECORD WITH CUE if the part you want to overdub is very far into the sequence. Then MERGE the two sequences together. Consider this example, let's call it sequence C. Since it is a long sequence, we will just list the section we want to fix in measure 17.

MSR-ST	EVNT	TIME	CH	TYP	NOTE		VEL	DUR
17-1	21	12	4	ON	G	4	52	15
17-17	22	16	4	ON	E	5	60	7
17-26	23	9	4	ON	C	5	60	7
17-42	24	16	4	ON	D	5	60	4
17-42	25	0	4	ON	A#	4	64	29
17-42	26	0	4	ON	A	4	60	29
17-88	27	46	4	ON	D	5	64	8
18-1	28	9	4	ON	C	5	60	6
18-9	29	8	4	ON	B	4	56	6
18-17	30	8	4	ON	G	4	73	7
18-72	31	55		DE				

Suppose that notes 24 - 26 are incorrect, and that we want to replace them with a phrase recorded in real-time. We can erase these notes using the Algorithmic edit command DELETE 'IN PLACE'. Type A24-26 (RETURN). When the Algorithmic options are displayed, select # 2. DELETE 'IN PLACE'. Re-list the sequence again; notice events 24 - 26 have been deleted, the time added to the next event, and the whole sequence has been 'compacted' down. The Sequence display

would then look like:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
17-1	21	12	4	ON	6 4	52	15
17-17	22	16	4	ON	E 5	60	7
17-26	23	9	4	ON	C 5	60	7
17-88	24	62	4	ON	D 5	64	8
18-1	25	9	4	ON	C 5	60	6
18-9	26	8	4	ON	B 4	56	6
18-17	27	8	4	ON	6 4	73	7
18-72	28	55		DE			

When you play the sequence now there will be a hole in it. Next record an OVERDUB. Since the part we want to add is 17 measures into the sequence, use RECORD WITH CUE. Specify C as the sequence to OVERDUB to and to use as the CUE. Sequence to store OVERDUB can be any blank sequence, say D for now. For a cue point, specify measure 15. This will give you two measures to get the feel. Sequence C will start playing from measure 15 and you can begin recording. If you make a mistake, press F5 and Sequence C will again start from measure 15 and you can try recording again. When thru recording press F7. Both sequence C and D will again play back from measure 15. If you don't like the results, press F5 and try again. If you are satisfied, press F7 to get back to the main menu.

Go into EDIT and look at sequence D. It might look like the following:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
17-38	1	1669	4	ON	D 5	52	33
17-40	2	2	4	ON	E 5	44	31
17-43	3	3	4	ON	F# 5	48	29
17-45	4	2	4	ON	A 5	32	27
18-72	5	123	4	ON	DE		

Notice that the program automatically inserted the proper amount of space at the beginning of the sequence and that this overdubbed Sequence will fit in the space we created using DELETE 'IN PLACE' in the original Sequence.

Now let's MERGE the two sequences together. From the main menu select option 6 - MERGE SEQUENCE. Specify D as the SOURCE and C as the TARGET. Now list Sequence C, it should look like:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
17-1	1	0	4	ON	6 4	52	15
17-17	2	16	4	ON	E 5	60	7
17-26	3	9	4	ON	C 5	60	7
17-38	4	12	4	ON	D 5	52	33
17-40	5	2	4	ON	E 5	44	31
17-43	6	3	4	ON	F# 5	48	29
17-45	7	2	4	ON	A 5	32	27
17-88	8	46	4	ON	D 5	64	8
18-1	9	9	4	ON	C 5	60	6
18-9	10	8	4	ON	B 4	56	6

```
18-17  11   8      4 ON  6  4  73   7
18-72  12   55       DE
18-72  13   0        DE
```

Notice that all events of both Sequences have been blended together and that the MRS-ST and TIME lines reflect the new values. The advantage of this method is you do not risk erasing correct notes by punching in too soon or out too late. You may use option Y CLEAR DELETES to get rid of the extra DELETES in the sequence.

SEQUENCER JAMS

If you have already recorded several different Sequences, you can use the COMPUTER option of REAL-TIME RECORD to create a CONTROL SEQUENCE by recording KY events in real-time. You can record multiple takes to get added perspective on the length and structure of your piece. You can AUTO-CORRECT the times of the KY events just as you would AUTO-CORRECT note times.

Select REAL-TIME RECORD and turn on the computer option. Now all your key depressions on the computer will be recorded as a sequence. This will become the new CONTROL sequence. If you have recorded your MIDI drums on seperate tracks, you can do 'dub' mixes on them by recording mutes/unmutes. You can even build up control tracks for each instrument.

SYNCRO-SONIC ECHO EFFECTS

You can create an echo effects by using ALTERNATE KEY ASSIGNMENTS and calling them up later in time. Define an ALTERNATE KEY ASSIGNMENT for each echo that you want and then put them into a CONTROL SEQUENCE. In the following CONTROL SEQUENCE, Sequence 1 consists of a melody line and Sequences M, N, and O are ALTERNATE KEY ASSIGNMENTS.

```
MSR-ST  EVNT  TIME CH TYP NOTE VEL DUR
------- ---- ----- -- --- ---- --- ---
  1-1    1     0       1     0   0   1
  1-7    2     6       M     0  -13  1
  1-13   3     6       N     0  -20  1
  1-19   4     6       O   -12  -30  1
  2-25   5     86      DE
```

Notice that sequences M, N, and O are progressively later in time and softer in volume, assuming your synth responds to velocity as amplitude. Sequence O is also an octave lower in pitch. You can use a structure like this to create syncro-sonic effects by using multiples in the time column. (3, 6, 12, 24, 48 etc.) If you change the tempo, the echoes will still maintain the same time relationship.

WAIT

The WAIT command forces the computer to finish playing the currently called Sequence before continuing to play any new Sequences. The letter W will be displayed in the W column of the PLAY screen when a WAIT command has been encountered.

Notice that the program does not take WAIT commands into account when computing the MEASURE and STEP values.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		1	0	0	4
1-1	2	0		2	0	0	4
1-1	3	0		3	0	0	4W
1-1	4	0		A	0	0	2

The WAIT command is also used to create groupings of Sequences which will play simultaneously. In this example the program begins playing the first three Sequences (1 - 3) immediately. When the W at the end of line 3 is encountered, the program will WAIT until the four repetitions have finished before going on to play the next event, Sequence A.

If you are grouping Sequences together and using a WAIT command, it is your responsibility to determine that the Sequences are the correct length. If Sequence 1 were two measures long and Sequence 3 one measure long, then Sequence 1 would continue to play for four more measures while Sequence A began playing.

You may discover some interesting permutations by REPEATING Sequences of different lengths.

VAMPING

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		I	0	0	1
1-1	2	0		6	0	0	99W
1-1	3	0		E	0	0	1

This example creates the situation where one can 'vamp' or jam with the Sequencer. The piece consists of an Intro section, Sequence I, a Vamp section, Sequence 6, and an Ending section, Sequence E. After the Intro, Sequence 6 will loop until you press the FOOTSWITCH or F7. When this occurs, Sequence 6 will complete its current cycle, and the Ending section will play.

Further complexity can be added to the piece by having any of the Sequences, I, 6, and E also be CONTROL SEQUENCES.

PROGRAMMING A SONG WITHOUT USING WAITS

Sometimes you may find it useful to program your song without using WAITS. Creating a complex song without WAITs gives you complete control of the starting time of each separate part. You will have to calculate the correct starting times so that the different parts 'sync' properly with each other. Here is a control sequence using WAITS.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		ST	A	0	1W
1-1	2	0		ST	05	0	1W
1-1	3	0		ST	3	0	2W

```
1-1   4    0        ST  1      0  4W
1-1   5    0        ST  17     0  1W
1-1   7    0        DE
```

While in EDIT check out the length of each sequence called, erase the W from the DUR column and then put that sequence measure length into the TIME column for the NEXT EVENT (multiply the number of measures by 96 for clock counts). For instance if A is 8 measures, put 768 in the TIME column for event 2.

```
MSR-ST  EVNT  TIME  CH TYP NOTE VEL DUR
------- ---- ----- -- --- ---- --- ---
  1-1    1     0        ST  A      0  1
  9-1    2     768      ST  05     0  1W
```

When you relist the sequence the MSR-ST column will reflect your changes. Go thru each event and trace back thru the sequences to determine their length. If a called sequence itself has multiple repeats or a WAIT and it calls another sequence, check that out too. It may be best to replace all W's with their correct clock count to avoid confusion.

If a sequence plays more than once, multiply the number of measures times 96 times the number of repeats. When you're thru the control sequence might look something like:

```
MSR-ST  EVNT  TIME  CH TYP NOTE VEL DUR
------- ---- ----- -- --- ---- --- ---
  1-1    1     0        ST  A      0  1
  9-1    2     768      ST  05     0  1
 17-1    3     768      ST  3      0  2
 33-1    4     1536     ST  1      0  4
 65-1    5     3072     ST  17     0  1
 67-1    7     192      DE
```

PRESETS

Storing the Presets as part of the piece, lets you instantly recall the programs that were used should you wish to return to a song a week or month later (assuming you haven't changed the programs in your synth).

```
MSR-ST  EVNT  TIME  CH TYP NOTE VEL DUR
------- ---- ----- -- --- ---- --- ---
  1-1    1     0       1 P6   85
  1-1    2     0       2 P6   13
  1-1    3     0       3 P6   21
  1-1    4     0       4 P6   67
  1-1    5     0       5 P6   75
  1-1    6     0       6 P6   77
  1-1    7     0       7 P6   33
  1-1    8     0       8 P6    5
  1-1    9     0       9 P6    2
  1-1    10    0      10 P6   25
  1-1    11    0      11 P6   17
  1-1    12    0      12 P6   22
  1-1    13    0      13 P6   13
```

```
1-1   14   0      14 P6   63
1-1   15   0      15 P6    3
1-1   16   0      16 P6    4
1-1   17   0         DE
```

You can also store the presets defaulted to 0 in a song shell and then change the PRESET sequence as you create your parts.

CHANGING PROGRAMS AS SONG PLAYS

You may sometimes encounter difficulties in changing PROGRAMS while a sequence is playing (Instrument glitches, a missing note, or spitting sound). P6 changes should be made while no notes are being sent to that instrument. You can do this by making P6 changes a few clock counts before a new sequence is to begin. The amount of time needed depends on the particular instrument. Some instruments respond slower than others. Some instruments can also change to certain programs faster than others, depending on what bank of programs the synth is currently in.

Make sure the DURation time for any note being played is over before the P6 event takes place, otherwise you may get a glitched note. You will have to determine which sequence is being played and then go into EDIT and check the note for the particular MSR-ST #.

This sequence is called SONGPRGS and is similar to the PRESET sequence except that it changes the programs for different instruments as the piece progresses.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
16-95	1	1534	4	P6	21		
32-95	2	1536	4	P6	4		
32-95	3	0	5	P6	35		
48-95	4	1536	4	P6	7		
48-95	5	0	5	P6	68		
64-95	6	1536	4	P6	21		
64-95	7	0		DE			

Notice that the program changes start two clock counts short of a whole measure. This lets the synth change programs before it has to play a note. You may have to vary this depending on the instruments you are using. Of course if a sequence starts with a rest, you might make the program change on the first clock count of a measure.

It makes no difference to the computer if a P6 event is played from the SONGPRGS sequence, the SONG sequence, or the note sequence itself.

One method of figuring out where all the P6 changes should go is to copy the control sequence (let's call it S) to another sequence (U) and make note of where you want P6 changes. For instance, every time sequence D is called you want MIDI channel 5 to change to program 23. When sequence D is over MIDI channel 5 goes back to program 7.

Go thru sequence U and find all ST events to D, make them P6 changes for MIDI channel 5. Make the rest of the events DE's. When you have done this, subtract

4 clock counts from the first event in sequence U. Relist sequence U.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		DE			
8-93	2	764	5	P6	23		
16-93	3	768		DE			
32-93	4	1536	5	P6	23		
64-93	5	3072		DE			
66-93	7	192		DE			

Now EDIT sequence D and put a P6 change back to program 7 at the very end of the sequence before the last DE event. Make sure the time under DUR is short enough (if neccessary shorten it) so that the note is finished before the program change occurs.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
16-1	12	12	5	ON	C 5	60	10
16-13	13	24	5	ON	B 4	56	16
16-37	14	24	5	ON	G 4	73	18
16-61	15	24	5	P6	7		
17-1	16	36		DE			

Finally make sequence S also call sequence U on the first event, so the two sequences will be running simultaneously.

GENERAL DRUM MACHINE INFORMATION

NOTE - it is the users responsibility to ascertain the functions of his equipment and how different pieces will interact with each other. Some drum machines can only send out a clock or sync to an external source, but not do both at the same time. Some machines may claim to do both, but in reality, are not able to sync, and send out pulses, or MIDI clocks with 100% accuracy. The result will be the machines losing sync with the tape or with each other.

Drum machines manufacturers unfortunately have not universally chosen to adopt a set of standards. There are two basic formats with a few variations among the six most popular drum machines. See APPLICATIONS in the APPENDIX for individual specs on some machines. The two formats used in drum machines are:

1. PULSE CLOCK IS ON when machine is running.
   NO CLOCK when machine is OFF.

DRUM MACHINE	STEPS/QUARTER NOTE	BEATS/MEASURE
YAMAHA RX11 & RX15	24	96
DRUMULATOR	24	96
LINN	48	192
OBERHEIM DX & DMX	96	384

With one of these drum machines and Sequential or Model T, run a guitar cord from the CLOCK OUT of the drum machine to the CLOCK IN of the interface. If you are using a Model 64, be sure the clock select switch is to the left.

2. PULSE CLOCK ALWAYS ON
   RUN/STOP signal IS HIGH when ON and LOW when OFF.

ROLAND DRUM	24	96
KORG DRUM	24	96

These machines use a DIN connector on their sync input and output jacks. When using either of these machines with the SCI- 64 box, you must use a stereo plug in the SCI START/STOP jack. Wire the CLOCK signal, pin 3 of the ROLAND or KORG to the TIP of the stereo plug and wire the RUN/STOP signal, pin 1 of the ROLAND or KORG to the RING of the stereo plug (right below the tip). Be sure the clock select switch is to the right.

When the PASSPORT interface is used to drive either the ROLAND or KORG drumbox, pin 3 out will have the CLOCK and pin 1 will have the RUN/STOP. The user can set the RUN/STOP to toggle on and off when the internal clock is started or stopped, or to be on while the clock is running. Use the setting which works with your machine.

MAKING AN ADAPTER CABLE FOR ROLAND/KORG MACHINES

If you are using a ROLAND or KORG drumbox with a Model 242 and you want to start your sequences and the drum box at the same time, you will have to invert an AND GATE in the patch cord. Make the following connections:

Connect pin 1 of the DIN to pin 7 of a 741 or equivalent op amp. Connect the ground of the DIN to pin 4 of the 741 and ground of a 1/4 inch plug. Connect pin 3 of the DIN to pin 3 of the 741. Connect pins 2 and 6 of the 741 to each other and the tip of a 1/4 plug, which you then plug in to the CLOCK IN of the Model 242.

MAKING AN ADAPTER CABLE FOR THE KMS-30 SYNCHRONIZER and MODEL-T INTERFACE

Connect Din pin 2 to ground of 1/4 inch plug.
Connect Din pin 3 to tip of 1/4 inch plug.

MIDI CLOCK DRUM MACHINES

Again different manufacturers approach everything differently; you will have to experiment with equipment to find you what it can and cannot do if the manual is not clear.

An invaluable tool for this purpose is a MIDI data analyzer. This is a program which you run on your computer while your MIDI drum machine or instrument is plugged into the MIDI interface box on your computer. The program will display exactly what the device is putting out. There are a few such programs available; and there is even a listing of a program in the Sept 86 issue of Electronic Musician.

Some drum machines (YAMAHA and some Roland models) can send and receive either a pulse or MIDI clock. This provides you with several options. You could configure your system to run from an internal clock and send out a MIDI clock to drive the drums. This would still require you to create patterns on the drum machine and then write the patterns into a song.

Another alternative is to have the SEQUENCER play the drums by sending the required note values over MIDI. By recording drum parts from a KBD you can do a lot of subtle and/or drastic effects with VELOCITY which will control the amplitude of the drums. Another advantage of this method is that the total score for a song can be stored on disk.

The YAMAHA RX11 drum machine allows you to set the key and MIDI channel for each drum to be triggered. Thus you can create drum tracks which will do 'hits' with a bass part for instance. The drums can also be playing their own patterns simultaneously.

RECORDING MIDI DRUMS

Often you may find it more desirable to create drum patterns on your drum machine and then load them into the KCS. This way the score for a song is totally contained in the sequencer, and you don't have to worry about losing the drum programs.

The first consideration in recording MIDI drums, is to have the drum machine and the KCS in sync with each other. One device must be the Master and the other device must sync to the Master. Again you have to make sure that your machine can actually do two functions at the same time. There are a few different ways to do this; first try using the KCS as the master and a Yamaha RX11 as the slave.

Since one of the KCS default conditions is already sending MIDI clock, make the RX11 the slave by selecting the EXT MIDI clock. While holding down FUNCTION, press SYNC. Next push the NO button till 'MIDI CLOCK' is displayed. Make sure that the computer's MIDI out is connected to the RX11's MIDI in.

Set up the KCS to record a sequence in REAL-TIME. Make sure the KCS is ECHOING to the MIDI channel the drum machine is on. Turn on ALIGN and then start the drum machine. You will hear a sort of 'phase' quality to the sound because the drum machine is actually playing two notes of each beat; one it generated, and the second is the note echoed back by the computer. Shortly before the end of the desired measure, press F7 to stop recording.

Without shutting off the drum machine, change patterns so that it is playing a 'blank' pattern (I always leave pattern 99 blank). Now you should hear the pattern normally. Quit recording and go into the EDIT mode.

When you list the sequence you may find that the second note is off by one clock count. It may be an 11, when it should be 12 for instance (all the following notes will be 1 clock count off also).

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	1	ON	A 2	73	1
1-1	2	0	1	ON	A 3	101	1
1-12	3	11	1	ON	A 3	101	1
1-24	4	12	1	ON	E 3	53	1
1-36	5	12	1	ON	A 3	101	1
1-48	6	12	1	ON	A 2	73	1
1-48	7	0	1	ON	A 3	101	1
1-60	8	12	1	ON	B 3	49	1
1-60	9	0	1	ON	A 2	73	1
1-72	10	12	1	ON	E 3	53	1
1-72	11	0	1	ON	A 3	101	1
1-84	12	12	1	ON	B 3	49	10
1-96	13	12	1	ON	A 2	73	1
1-96	14	0	1	ON	A 3	101	10
2-1	15	1		DE			

You may also find that the end of the sequence contains drum beats for what should actually be the next measure and a DE event only one count later. When this sequence loops around, you will notice the double kick, which stands out as being 'uneven' in relation to the rest of the kick beats.

What happened was the sequencer really missed the first beat of the measure and everything was 1 clock count off, hence the extra kick at hat at the end of the sequence. Fix event 3 by making it a TIME of 12, then DELETE events 13 - 14 and give the DE event a time of 12 to make up for the deletions you made. After cleaning up your sequence it should look something like:

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	1	ON	A 2	73	1
1-1	2	0	1	ON	A 3	101	1
1-13	3	12	1	ON	A 3	101	1

1-25	4	12	1	ON	E	3	53	1
1-37	5	12	1	ON	A	3	101	1
1-49	6	12	1	ON	A	2	73	1
1-49	7	0	1	ON	A	3	101	1
1-61	8	12	1	ON	B	3	49	1
1-61	9	0	1	ON	A	2	73	1
1-73	10	12	1	ON	E	3	53	1
1-73	11	0	1	ON	A	3	101	1
1-85	12	12	1	ON	B	3	49	10
2-1	13	12	DE					

GENERAL MIDI INFORMATION

Most MIDI connectors are 5 pin DINs but a 3 pin CANNON connector may also be used (the VOYETRA). There is no physical conductor between the MIDI IN of one machine and the MIDI OUT of another, so you can't blow something by incorrect patching.

Although MIDI cables look identical to sync cables, the grounding of the two cables is different. A sync cable can cause problems.

The signal found at the MIDI THRU jack is a copy of what is present at the MIDI IN jack. When an instrument is acting only as a master, no signal is present at the THRU jack. The signal at the MIDI IN jack will likewise have no effect on the MIDI OUT signal.

Not all instruments have a MIDI THRU. You will need a MIDI junction box if you have more than one instrument with doesn't have a THRU. The junction box can also be used to reduce the MIDI time delays (about 7 milliseconds per instrument) created when MIDI instruments are chained together.

MIDI MODES

The four MIDI modes are:

Omni On Poly
Omni Off Poly
Omni On Mono
Omni Off Mono

When a KBD is put in an Omni On mode it will respond to information sent on all of the 16 MIDI channels. When it is in an Omni Off mode, an instrument will respond only to events on its designated channel.

An instrument in Poly mode can play more than one note on each channel. An instrument in Mono mode can play only one note per channel.

The choice of MODE will affect different instruments in different ways. A Six-Trak or CZ-101 becomes MULTI-TIMBRAL in mono mode. It can play one note on each of six (Six-Trak) or four (CZ-101) consecutive MIDI channels, using a different patch program on each channel. You can insert MODE changes in your Sequences using the procedure described in the section USEFUL MIDI COMMANDS.

Some instruments cannot be put into certain modes; a DX7, for example, cannot be placed in Omni On mode and can never play more than one patch program at a time, although there are programs which sound like there is a split and there are two different programs.

With a Six-trak, or Casio CZ-101, you may have the instrument playing an electric piano part (Omni Off Poly), pause and then start playing four monophonic lines (Omni Off Mono) using different instrument voices.

Some synthesizers can be placed in a mode called LOCAL CONTROL OFF. In this mode, they will respond ONLY to signals coming in via MIDI. They will continue to send keyboard information via MIDI OUT.

Local Control On will return the synth to sounding whatever is played on it's KBD.

System Common messages are sent to all instruments regardless of MIDI channel assignment. The TIMING CLOCK will advance drum machines and sequencers to move in time with the KEYBOARD CONTROLLED SEQUENCER.

System Real-time messages can be used to START, CONTINUE, or STOP external sequencers and drumboxes. If the INTERNAL CLOCK is in use, the program will automatically send a MIDI START when the clock is started. It will always send a MIDI STOP when F5 or F1 is pressed in play mode.

System Exclusive information is designed to be understood by synthesizers made by a specific manufacturer. For instance only YAMAHA instruments will respond to a YAMAHA System Exclusive command. A KORG or ROLAND synth will ignore the data.

The meaning of System Exclusive information is a function of the instrument used. You can use single byte events to send System Exclusive information, but it is YOUR responsibility to determine the response of your instruments to the information sent.

SOME USEFUL MIDI COMMANDS

Several MIDI commands for initializing your synthesizers can be sent from sequences. NOT ALL COMMANDS WORK WITH ALL INSTRUMENTS. For more information, consult your synthesizer documentation. DO NOT CALL DR. T's ASKING ABOUT SPECIFIC SYSTEM EXCLUSIVE MIDI COMMANDS.

Initialization commands are entered into sequences from the computer KBD as control changes, event type CC. Make sure the information is sent on the channel your instrument is receiving on. Enter Control Change under TYP, the type value under NOTE and the value under VEL:

```
MSR-ST  EVNT  TIME CH TYP NOTE VEL DUR
------- ---- ----- -- --- ---- --- ---
  1-1    1     0     4 CC  Type Value
```

```
Type = 122 : Value = 127    Local control on
Type = 122 : Value = 0      Local control off
Type = 123 : Value = 0      All notes off
Type = 124 : Value = 0      Omni off, all notes off
Type = 125 : Value = 0      Omni on, all notes off
Type = 126 : Value = 0      Mono on, omni off
                            all notes off,
                            1 channel per voice
Type = 126 : Value = N      Mono on, all notes off
                            N channels used
                            (not implemented on
                            most machines)
Type = 127 : Value = 0      Poly on, omni off
```

ASSIGNING A MODE AND VOICES

This sequence was programmed for use with a CZ-101 on MIDI channel 5. It would first put the instrument in MONO ON, OMNI OFF mode, and then assign voices to the instrument on its new receive channels, 5 - 8.

```
MSR-ST  EVNT  TIME CH TYP NOTE VEL DUR
------- ---- ----- -- --- ---- --- ---
  1-1    1     0     5 CC  126  0
  1-1    2     0     5 P6  0
  1-1    3     0     6 P6  32
  1-1    4     0     7 P6  48
  1-1    5     0     8 P6  64
  1-1    6     0       DE
```

CC VALUES FOR CONTROLLERS

Different instruments may use different controller numbers, check your manual. The following CC numbers can be used to control a YAMAHA TX7 module:

```
Type = 1 : Value = 0 - 127  Mod wheel
Type = 2 : Value = 0 - 127  Breath Controller
Type = 3 : Value = 0 - 127  Foot Control
Type = 5 : Value = 0 - 127  Portamento
Type = 7 : Value = 0 - 127  Volume
Type =64 : Value = 0 , 127  Sustain switch
Type =65 : Value = 0 , 127  Portamento switch
```

In real-time the following SINGLE BYTE messages may be useful:

```
248    Timing clock
250    Start
251    Continue
252    Stop
```

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
17-1	1	1536		*	252		
18-1	2	96		DE			

If you had a MIDI drum machine looping one pattern of its own, keeping time with the KCS and you didn't want to figure the end out for the drums, you could add the above sequence to the end of the song. This STOP command would shut off the drums after 16 measures had elapsed. The drum machine will stop immediately.

If any of your synths have their own internal MIDI sequencers, you can stop and start them from the KCS.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
9-1	1	768		*	250		
17-1	2	768		*	252		
25-1	3	768		*	250		
33-1	4	768		*	252		
41-1	5	768		DE			

This sequence will alternately start and stop and MIDI devices every eight measures. Make sure your MIDI drum machine is not the Master otherwise once the KCS shuts off the drums, there will be not further clocks and nothing will play.

You can intersperse TIMING CLOCK signals into a Sequence which contains either CONTROL data or NOTE data.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0	4	ON	G 4	64	8
1-1	2	0		*	248		
1-7	3	6	4	ON	F 5	64	8
1-7	4	0		*	248		
1-13	5	6	4	ON	A 4	64	8
1-13	6	0		*	248		
1-19	7	6	4	ON	A# 4	64	8
1-19	8	0		*	248		
1-25	9	6	4	ON	G 4	64	8
1-25	10	0		*	248		
1-31	11	6	4	ON	F 4	64	8
1-31	12	0		*	248		

This sequence would play notes on an instrument assigned to MIDI channel 4. The sequence also sends a MIDI timing clock with every note. This clock could be used to advance an external device. Note that the KCS is initialized to send MIDI clocks already.

TROUBLE SHOOTING

The KEYBOARD CONTROLLED SEQUENCER can be used with many different pieces of equipment. You will very likely have a problem whose solution is not obvious. This section describes many of the problems that you might encounter while using the program.

Note that there are a lot of instruments with many MIDI features. Theoretically all instruments are supposed to compatible, but in reality certain software or hardware features may not be. You may be trying to do something a particular piece of equipment was not designed to do.

When you get into situations like this a MIDI data analyzer program may be very helpful. You can then ascertain if a piece of equipment is doing what it is supposed to do. DR. T CAN ONLY ANSWER QUESTIONS DIRECTLY REGARDING THE OPERATION OF ITS SOFTWARE AND NOT ANY QUESTIONS REGARDING THE IDIOSYNCROSIES OF A PARTICULAR PIECE OF EQUIPMENT.

There are two general tactics that are useful when trouble-shooting a complex system. You can attempt to isolate the source of the trouble by changing one aspect of the system at a time. You can also simplify the system by using fewer pieces of equipment or program features. You should try both approaches when confronted with a problem in the use of the software.

In general, problems are most likely to be caused by mis-use of the software, incorrect setup of the hardware, or user misunderstanding of the way a specific piece of hardware interacts with the software. Problems can also be caused by malfunctioning hardware (computer, disk drive, interface or synthesizer), program bugs, or a bad program disk. A bad disk will almost always cause errors in program LOADING, rather than program execution.

PROGRAM GIVES ERRORS ON LOADING

There are two possible causes of this. If you use a disk with an interface for which the disk is not valid, or do not follow the loading procedure for the interface used, the program may give errors before the loading process is complete. If you have a bad program disk, you will also experience loading errors. If you suspect that you have a bad program disk, CALL DR. T'S TO ARRANGE FOR A REPLACEMENT.

COMMODORE APPEARS DEAD

Adjust monitor settings. Power down and unplug MIDI box, on repower does computer respond OK now? Is DRIVE on and is drive cable OK? Power down and connect MIDI box again. Is MIDI box plugged in completely? Is SHIFT LOCK key off and 40/80 DISPLAY down?

If monitor screen is blank when the MIDI interface box is plugged in, but OK with the MIDI interface box unplugged, your 128 may be defective (several users have had this problem). Try to check out the interface box on another C128 or C64 computer.

DISK DRIVE PROBLEMS - DRIVE APPEARS DEAD OR GIVES ERROR MESSAGES

If the Drive appears dead on loading the program, type OPEN 15,8,15,"I"(RETURN). Wait one minute, and load the program. Also make sure the Disk Drive cable is securely plugged in to the 128.

If you attempt to load or save a file with the Disk Drive off, you will get the error message DEVICE NOT PRESENT. Press (RETURN). You will be returned to the MAIN MENU with your data intact.

If you attempt to do a Disk operation with the door open, or no disk in the drive, you will get a DISK ERROR READ ERROR or DRIVE NOT READY message. Press (RETURN) to get back to MAIN MENU, close the drive door and try again. On some machines, repowering only the DRIVE will work (remove disk first).

If you continue to get ERROR messages after doing the above. Insert the Program disk and return to INITIALIZATION and then to the MAIN program.

If the LED on the drive is continually blinking, this indicates a disk I/O error. Shut off the drive for 10 seconds and then repower. You should make safety copies of any important files (on a different disk).

DISK DRIVE CAN'T FIND A FILE

If you are using a 1571 drive and you are swapping disks, particularly any disks that were formatted in a 1541, it is possible for the Drive to get 'confused' into thinking there is only one side of a two sided disk. Remove the disk and shut off the drive for a few seconds and then repower.

NO INSTRUMENTS RESPOND

The program may crash. DID YOU ANSWER THE MIDI INTERFACE QUESTION CORRECTLY WHEN LOADING THE PROGRAM? Remove the disk, power down or reset the computer and load the program again.

Are synths wired up correctly and set to the correct MIDI channel? Put them into OMNI mode if you can do this locally. Is MIDI box plugged in completely? Are MIDI cables good?

Is program looking for a non-existent external clock? Reset program for internal clock and try that first. Is recording KBD actually sending anything to computer? Use LIST and EDIT commands to verify. Write a simple sequence from computer KBD or load one of the demo files and send that to instruments. Disconnect synths, and start with one synth connected or try plugging one KBD MIDI OUT to a second instrument MIDI IN to check cables and ascertain that the instruments work by themselves.

SOME INSTRUMENTS RESPOND, BUT NOT ALL

Check wiring. Turn all instruments to an OMNI mode and try connecting one instrument at a time to the Commodore. One instrument could have a bad MIDI THRU. Are instruments ENABLED and set to proper channels. Is the Sequencer ending on the correct channel?

SOME INSTRUMENTS DON'T RESPOND CORRECTLY ALL THE TIME

Some instruments can't respond to MIDI information at the full specified MIDI rate. DX7's in particular. The symptom is that the instrument appears to be missing voices. Not all notes sent to it are heard. Sometimes changing programs will reset it; a more drastic action is to repower the instrument.

Use the MIDISLOW function in the INITIALIZE section of the program to slow down the MIDI transmission rate. Use the lowest value which provides acceptable results.

MIDIfied DRUMULATORS sometimes don't respond to all the notes the KCS is sending. Try the MIDISLOW feature using a value of 100.

SEQUENCER PLAYS BACK, BUT NOTES ARE GARBLED

Is one instrument 'stuck' with one or more voices on? Reset the instrument by changing programs on the specific instrument, or power-down the instrument. Is your drumbox clock intermittent? Cable good? Try the INTERNAL clock.

Are notes overlapping improperly? If an instrument is in mono, and notes overlap, the instrument may not retrigger the envelopes. If an instrument is in poly mode and notes of the same pitch overlap, undesirable results are likely to occur. If a note ends and a new note begins in the same time step, the new note may start before the old one ends, causing overlap.

Program changes on some instruments, such as a DX7 or a Poly 800, can take up to 1/4 second. If you are using such an instrument, insert your program changes BETWEEN notes, instead of just before or after a note.

SYNTHESIZER 'SPEWS OUT' NOTES

If you loop a sequence that contains one or more MIDI events, with times of zero, the program will spew out these MIDI events as fast as it can, causing your synthesizer to sound as if its 'going haywire'.

If you loop a control sequence of length zero (Sequence calling a Sequence), and the control sequence does not have a WAIT programmed, that sequence will keep restarting all of the sequences it is controlling, and they will keep replaying their first notes.

Don't loop any sequence whose times are all zero, unless it has a WAIT programmed and a DE event at the end.

INSTRUMENT SENDS DATA, BUT DOES NOT RECEIVE

The instrument may not be set to receive on the MIDI channel that it is sending on. Are MIDI cables good? Some sync cables look like MIDI cables, but do not work. Is the Sequencer getting any data. If the program is expecting EXTERNAL CLOCK and does not receive it, it will not record. Use LIST and EDIT to check that you are sending valid data on the proper MIDI channel.

BAD DRUMBOX CONNECTION

Happens with SCI-Model 64 boxes. Results in no clock, or intermittent clock pulse getting thru. An intermittent clock results in wrong timing on playback. Check LISTING of sequence, is this what you played? Try using SCI program - is it intermittent here also? Change drum clock cables. Play a sequence and jiggle (very CAREFULLY making sure you move only the clock jack and not the MIDI box to computer connection). Does playing stop?

TIMING WRONG ON RECORDING

Are you using a footswitch? The SCI footswitch is a NORMALLY OPEN footswitch. Using a NORMALLY CLOSED footswitch will cause the program to respond when you LET UP the switch, instead of when you press down on it. Check for intermittent clock connection. Are you playing back sequences and trying to record fast pitchbends? MIDI data may be coming in faster than the processor is able to handle it.

Are you using INTERNAL CLOCK when you want to use EXTERNAL?

MIDI CONTROL PARAMETERS NOT RECORDED

Was the NON KBD EVENTS option selected in RECORD? Does this instrument send & receive all parameters? Use EDIT and LIST commands to verify that control changes were recorded. Do you need to set codes for your synth or send a SYSTEM EXCLUSIVE command? Early DX7s sent after-touch on MIDI channel one parameter 3. See REAL-TIME RECORDING.

SEQUENCE AND DRUMBOX GO OUT OF SYNC WHEN LOOPING

This occurs if the length of the sequence is not a multiple of the length of the drumbox pattern. If you do not use the ALIGN feature while recording, you will almost always end the recording process a little before or after the end of a measure. On Playback each loop will put the sequence further out of sync.

When using ALIGN, you must press the F7 key during the last measure that you wish to record. Pressing F7 a fraction of a beat into the next measure, will force the program to continue recording for another entire measure, even if you do not play any notes.

Alignment problems can be corrected after recording by using the EDIT option. Add or subtract time to the last DE event, making it occur on the first step of a measure. Check your correction by LISTING the sequence again.

Alignment problems can be created by inserting, deleting, or editing the time values of a sequence. Always check the sequence length after EDITING by listening the last event. If the value under ST is 1, the sequence is a whole number of measures long.

If a drumbox is MIDI syncing with the program and playing its own patterns, it may lose timing clock information if too much MIDI information is being sent. As the piece progresses the drum machine may go further out of sync. Does the drum keep sync when only playing a few sequences? Does it play better if no sequences with PB or CC events are happening?

One way around this is to make the drum machine be the master or else have the KCS play the drums instead of sending time to the drum machine to play its own patterns.

SYNTHS NOT ACCEPTING PROGRAM CHANGES

Some synthesizers, e.g. Sequential, power up in a mode in which they do not accept program changes via MIDI. Your synthesizer manual should contain instructions on how to make them accept program changes. The program will enable all MIDI sends and receives on a Six-trak, if the Six-trak is on and connected while the program is booted up.

CANNOT SET DESIRED CLOCK SETTING

You can use the change clock option to set the number of BEATS/MINUTE, but only certain values can be used. If you select a value that cannot be used, the program will round off to the nearest possible value. If you need more resolution, you will have to use an external clock.

DRUMBOX MEASURE DOES NOT EQUAL SEQUENCE MEASURE

The length of a measure in the sequencer is initially set to 96 steps. This is equivalent to 24 steps/quarter note, or 24 steps/beat. Use the CHANGE STEPS/MEASURE option found on MENU 2 to change the number of steps/measure in the sequencer to any value from 1 to 255. By setting CHANGE STEPS/MEASURE to 192, for example, you can sync to a 48 steps/quarter note drumbox.

Use the CHANGE CLOCK option on the INITIALIZATION menu to increase the number of external clock steps required for each sequencer step. By setting the EXTERNAL CLOCKS PER STEP to 4, and leaving the STEPS/MEASURE at 96, you can sync to a 96 steps/quarter note drumbox.

The external clock output of the Passport interface will produce only one pulse for every two internal clock steps. If you are driving a drumbox which requires pulses, you can achieve sync by setting the STEPS/MEASORE of the sequencer to double that of the drumbox.

Another method to achieve sync with the Passport interface is to double the number of EXTERNAL CLOCKS PER STEP. Then set the INTERNAL clock rate to twice the value actually desired.

A 'WAIT' THAT WAS PROGRAMMED DOES NOT OCCUR

Sequences which call other sequences and use the WAIT feature should have a DE event with a time of zero for the last event.

MSR-ST	EVNT	TIME	CH	TYP	NOTE	VEL	DUR
1-1	1	0		A	0	0	1W
1-1	2	0		DE			

If you do not do this, you will encounter problems when you try to chain this sequence into a 'higher level' control sequence.

NOTICEABLE TIME DELAYS OCCUR WHEN SEQUENCES START OR LOOP

The computer is a powerful, but finite tool. If you attempt to play several Sequences simultaneously, which in turn each play a lot of notes simultaneously, the computer may 'lag'. If this occurs, rearrange you sequence structure to reduce the amount of work the computer has to do in one time step. Edit the timing so that not as many Sequence start events occur at the same time.

SOME INTRUMENTS cannot change programs and try to sound a note in the same time step. See the note on program changes under SEQUENCER PLAYS BACK, BUT NOTES ARE GARBLED.

SYNTHESIZER NOT FUNCTIONING IN MULTI-TIMBRAL MODE

Some multi-timbral synthesizers (the Six-trak and the CZ-101), power up in poly mode. To use the multi-timbral feature, you must set them to MONO mode, either through MIDI (see the section on useful MIDI commands) or by following the instructions in your owner's manual.

The Six-trak will always transmit on its basic channel, so you may need to use local control off and echo mode to record in real-time. You will have to use the EDIT mode to insert program changes for each channel recorded, as selecting a program on the SIX-TRAK selects it for all six voices.

The CZ-101 is more flexible. You can select programs for all four channels independently from the instrument itself, or thru MIDI, and you can transmit on any of the four channels in use.

If a synth appears to be responding sluggishly in multi-timbral mode (short staccatto notes are lost or one note may have rough attack), try using the MIDISLOW command under GENERAL OPTIONS in the INITIALIZATION section of the program.

SEQUENCE NAME DISAPPEARS ON PLAYBACK

The REAL-TIME TRANSPOSE display and the sequence name display share the same space on the screen. You may have accidently set option 14 on REAL- TIME TRANSPOSE FUNCTIONS OPTION on the INITIALIZATION menu to turn. Return to INITIALIZATION and reset.

EQUIPMENT HOOKUP

To use the KCS-128 you must have the following equipment:

1 Commodore 128
1 disk drive (1571 preferable, 1541 acceptable)
1 80 column monitor
a printer is optional

NOTE: a 40 column monitor such as a Commodore 1702 or green screen may be used with an 80 column adapter cable, SKYLES ELECTRIC WORKS (415) 965-1735 makes an RGB to composite cable (name 2 for 1 monitor cable - list $14.95)
A TV set may be used, but picture quality is lacking.
Some monitors do not have audio. You must then plug the audio out of the C128 to an audio input on your board if you wish to use the internal metronome.

Follow the procedure in your Computer Owners Manual for standard hookup. With the power off, plug your MIDI interface box into the back of the Commodore.

If you are using a Sequential Circuits C-64 MIDI box, you must cover pins 8 and 9 with cellophane tape or cut these traces. Otherwise the Cartridge program will take control of the C128.

Be sure the MIDI box is fully inserted into the computer. If you have the SC-64 box, make sure its feet are resting securely on a firm surface.

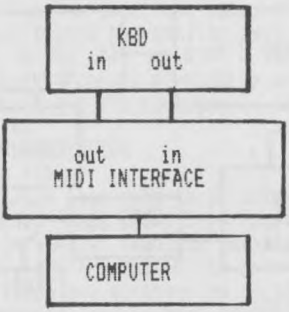
NEVER INSERT OR REMOVE THE MIDI BOX WHILE THE COMPUTER IS POWERED UP.

Take the MIDI OUT of the Keyboard from which you wish to record with and plug into the MIDI IN of the Interface box. Connect the Interface box MIDI OUT to your keyboard's MIDI IN. Connect other instruments by using the first Keyboard's MIDI THRU to a second instrument's MIDI IN. MIDI connectors are optically coupled so a wrong connection will at worst result in no data transmission. Be sure that each instrument is assigned to an appropriate MIDI channel and is activated to send and receive MIDI information.

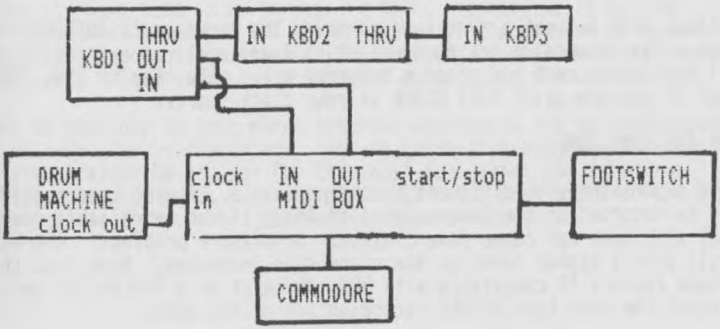
There are several ways various interface boxes, keyboards and drum machines may be connected. If your drum machine is MIDI compatible you may want to put it in the MIDI chain. You may need a sync box if you plan to overdub to tape. Most drum machines won't sync to tape and drive the SEQUENCER simultaneously. It will take some experimentation to find the set-up most suited to your individual needs.

You might find it easier to use the Sequencer clock while composing your piece and then switching your set-up for syncing to tape purposes.

BASIC EQUIPMENT SET-UP



SET-UP FOR THREE KBDS & DRUM MACHINE

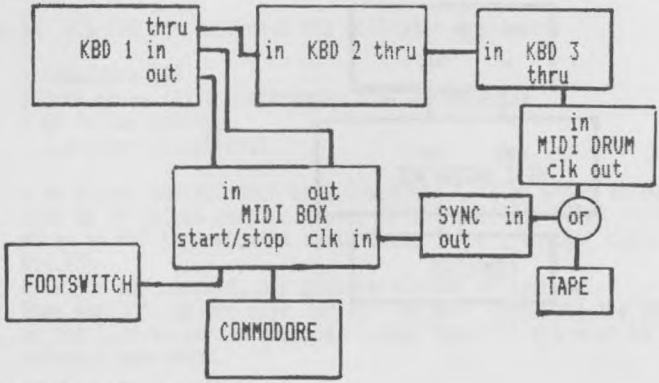


If you plan to use your drum machine to drive the KEYBOARD CONTROLLED SEQUENCER and you are using an SCI box, connect the drum machine's sync out to the SCI's CLOCK IN. If you have a Korg or Roland drum machine see GENERAL DRUM MACHINE INFORMATION in Chapter 7 for more details.

An optional ON/OFF footswitch may be plugged into the START/STOP jack of the SCI MIDI box. This duplicates the function of the F7 key.

NEVER MOVE THE COMPUTER WHILE THE SYSTEM IS POWERED UP! If contact is momentarily broken on certain pins between the Interface box and Computer, severe damage may result!

SET-UP TO SYNC TO TAPE



USING THE SYNC TO TAPE FUNCTION

Some Passport and Syntech interfaces are equipped with sync to tape. Such interfaces allow you to sync the software to tape without using a drum machine. Connect the tape out jack of the interface to a line in on your deck, and the tape in jack of the interface to the corresponding line out.

The interface will put out a sync tone whenever the sequencer's INTERNAL CLOCK is running. The internal clock does not start immediately upon entering play mode. It will start once you press a sequence key. Note that NO SYNC TONE will be put out if you are using MIDI CLOCK as your clock source.

RECORDING THE SYNC TONE

You should experiment with different recording levels. A sync tone should generally be recorded at the lowest level at which it can be reliably read. A high level sync tone may cause some crosstalk or erasure problems. Average meters will show a higher level as the clock rate increases. Note that the sync-to-tape feature IS compatable with DBX, at least on a TASCAM 234 deck. You should record the sync tone BEFORE recording any of the music.

The recording level of the sync tone and EQ are very critical. If you encounter problems, try different recording and playback levels. Experiment with the EQ also. Keep notes on what you do, so you can duplicate it again later. If you can afford it, leave a blank track between the sync track and everything else. Anything recorded adjacent to the sync track should be recorded at a low level.

SYNCING TO A RECORDED SYNC TONE

Make sure the output of the sync track on the tape is connected to the tape in of the interface, and that you have selected the TAPE SYNC option from the clock menu. Cue up the recording deck slightly BEFORE the start of the sync track. Put the sequencer in play mode and start the desired sequence(s). No music will play until the tape deck is started. Once the deck is started, the sequences will play in syncronization with the recorded sync tone.

Note that if you have both tape in and out connected, and are monitoring source instead of output from the deck, the sequence WILL start playing as soon as you press the key. Just change the monitor switch and start again.

If you use the F5 key to cancel play while using sync to tape, you will have to press the space bar to get the software to accept the sync signal again.

FINE POINTS OF SYNCHRONIZATION

The software recognizes time data to an accuracy of one time step, initially about 20 milliseconds. Some users have found that the 'feel' of a drum part changes depending on whether the drum machine is the master or the slave. This is because of subtle differences in the order in which things are done by the various devices. There are accessories on the market that will delay a clock slightly between devices, giving more control over 'feel'. Another way to get more control is to go to a faster clock rate, and adjust your sequences and drum programs accordingly. Obviously, 10 ms accuracy gives you more control than 20.

If you want to 'punch in' a sequence part in the middle of a previously recorded track, you can do so provided that your deck allows you to turn track record on and off 'on the fly'. Simply write a rest of the appropriate length at the beginning of the desired part, start the recorder from the beginning, and turn on track record just before you reach the new part. You can also start the desired sequence while the deck is running. Once started, it will stay in sync, but the starting time is up to you. A third possibility is to start the tape from the beginning and use the ALIGN feature of the program to be sure that the manually started sequence starts a whole number of measures from the beginning of the piece. This saves the trouble of calculating the desired rest.

It MAY be possible to sync other external devices to the software using the tape sync in. We give no guarantees, and one technician expressed concern that a 5 volt signal might be too hot for the input and damage the interface. This seems unlikely, but proceed at your own risk. It takes four ticks of the sync track to produce one tick of the interface's internal clock.

VALUES FOR AUTO-CORRECT			ABBREV. in EDIT or TYPE FROM COMPUTER		
3	=	32nd notes	A	=	last value used
4	=	16th note triplets	(SHIFT) E	=	16th note triplets
6	=	16th notes	S	=	16th notes
8	=	8th note triplets	(SHIFT) Q	=	8th note triplets
12	=	8th notes	E	=	8th notes
16	=	quarter note triplets	(SHIFT) H	=	quarter note triplets
24	=	quarter notes	Q	=	quarter notes
48	=	half notes	H	=	half notes
96	=	whole notes	W	=	whole notes
			(SHIFT) W	=	whole note triplets

Default values assigned to REAL-TIME TRANSPOSE keys:

KEY	TRANSPOSES	AMOUNT	use (SHIFT) & any key
+	PITCH	1 half-steps	to TRANSPOSE DOWN
-	PITCH	2 half-steps	
LB	PITCH	4 half-steps	use 0 key to shift RT
C(CLRHOME)	PITCH	7 half-steps	TRANSPOSE seqs ahead.
I(INSTDEL)	PITCH	12 half-steps	
@	VELOCITY	6 units	use LEFT-ARROW to shift
*	VELOCITY	12 units	RT TRANSPOSE seqs back.
UPARROW	VELOCITY	24 units	
(RETURN)	DURATION	1 unit	
CRSR U/D	DURATION	3 units	
CRSR L/R	DURATION	6 units	

PLAY/RECORD

0,F1	exits from any function requiring a sequence key or number
1-9, A-Z	refers to Primary sequences
LINEFEED 00-92	refers to Secondary sequences
C	re-enters line in TYPE FROM COMPUTER.
P	goes to PLAY from main menu
Z	replays current Sequence in EDIT or STEP RECORD.
TAB	replays the last cue sequence defined.
ESC	pause in RECORD or PLAY.
< or >	moves cue point 2 measures back or forward
SHIFTSPACE < or >	moves cue point 8 measures back or forward
SHIFTSPACE	a 2nd time resets to 2 measure change

F1	EXITS to MAIN MENU	F6	Changes CUE SEQUENCE 1 value lower
F3	ALIGNS playback of Seq.	F7	Cancels REPEATS (PRIMARY)
F5	STOP & shut off clock	F8	Changes CUE SEQUENCE 1 value higher

(SHIFT) F1 F3 F5 resets REAL-TIME PITCH, VEL, & DUR transposes

FUNCTION KEYS IN REAL-TIME RECORD AND OVERDUB

F1	EXIT to MAIN MENU	F7	Start RECORD with silence
F3	ALIGNS end of sequence		Stop RECORD & start PLAYBACK
F5	ERASE and RESET	SPACEBAR	starts internal clock
	shut off internal clock		

FUNCTION KEYS IN STEP-TIME RECORDING

F1	QUITS PLAY mode	F7	PLAYS Sequence back
	again EXITS to MENU 1	ESC	plays last 8 notes
F3	new TIME for next note	TAB	plays last 24 notes
F5	INSERTS a REST	LEFTARROW	deletes last note of sequence

EDIT

P	plays current sequence
X, F1	specifies SELECTION CRITERIA
Z	goes directly from TYPE FROM COMPUTER KBD to EDIT
Z(seqkey)	Edit a new sequence
@	goes to STEP-TIME record from EDIT
!	go to main menu from EDIT.
*S-4	in EDIT plays any PRIMARY sequence from any measure
LEFT ARROW	in EDIT quits listing, in play move RT TRANSPOSE range.

FORMAT FOR EDIT COMMANDS

A, C, D, H, L, M, P, Q, & T commands all use same format.

L2	List single event
D4-10	Delete range of events
X or F1	after A or T calls Selection criteria
MT	Specify measure range to transpose
P3-	Play event 3 to end
T	Transpose whole sequence
LM2	Specify events on one MIDI channel
EXCEPT	D (no range) is not a valid format for DELETE
EXCEPT	TM1 If a Sequence contains events on several MIDI channels, you can't transpose only 1 channel
NAME = NBASS	6ive Sequence an 8 character NAME.
REPEAT = R8	Set number of repeats.
SWITCH = S1-2	Switch all events to another MIDI channel.
MOVE = M3-12	Range must be specified. Program will prompt
COPY = C1-19	INSERT AFTER: Respond with event number.
INSERT = I	Insert at beginning of Sequence.
I12	(specify event # to insert after).
EXTEND = E	Add events to end of Sequence.
EXIT = X,F1	Press 2X if in LIST mode. Press 1X if in EDIT MENU PA6E.

TYPE FROM COMPUTER EVENTS

ON - note on	1 - 9 or A - X
OF - note off	ST - (secondary seq 00-92)
P6 - program change	XX - sequence stop event
CC - control change	KY - keypress event
AT - aftertouch	DE - deleted event or rest
PB - pitchbend	* - single byte event

APPLICATION NOTES

Since new equipment continues to be released at an increasing rate, it is not possible to make a complete listing of products that will work with the KEYBOARD CONTROLLED SEQUENCER. Many instruments share design features, so the following information may be useful even if you do not own the instruments discussed.

Instruments are listed in alphabetical order.

CASIO CZ-101

The CASIO CZ-101 is a programmable eight voice polyphonic digital instrument. It can hold 32 programs (16 of these are presets and may not be changed) or 48 programs if you buy the optional RAM cartridge. Dr. T's SOFTWARE also has available a PATCH PROGRAMMER.

The CASIO CZ-101 is very useful with the KEYBOARD CONTROLLED SEQUENCER because it can also function as four mono synths. It may be programmed to work on any four adjacent MIDI channels, with each channel playing a different sound. One drawback is that there is only one output jack for the four different sounds. You will have to change DCA envelope levels to balance the relative volumes.

There is no MIDI thru, so you'll need a MIDI junction box or else patch the CZ at the end of the MIDI chain. The CASIO is not sensitive to velocity but responds well to DURATION because of its three 8 stage envelope generators.

You can put the CZ-101 in mono multi-timbral mode by pressing the SOLO button. You can then use the MIDI, cursor right, and up-arrow buttons to select programs, or you can select programs from the Sequencer. Note in the multi-timbral mode the CZ may not always react predictably. Notes may get chopped or missed. If doing serious recording, you may wish to use a syncing device and record each Casio part in normal rather than in mono mode. This will also depend on what patches you are using and the value of the notes it is receiving.

Casio has an 'overlap' in its program calling. A program on the Casio when called from the KCS can be specified with either of 2 numbers.

FROM SEQUENCER SPECIFY	CASIO RESPONDS
P6 0 - 15	Presets 1 - 16
P6 16 - 31	Presets 1 - 16
P6 32 - 47	Internal 1 - 16
P6 48 - 63	Internal 1 - 16
P6 64 - 79	Cartridge 1 - 16
P6 80 - 95	Cartridge 1 - 16

KORG EX-800 and POLY 800

These two synths are similar with the newer EX-800 being a keyboardless version of the Poly-800 with a few more features. Both machines send on channel 1 and may be set to receive on any channel and both may select an external MIDI clock to drive their own sequencer along with Dr. T. The Poly 800 sends its sequence data on channel 2. These instruments both select programs using 'banks'.

DR. T program #	KOR6 #:
0 - 7	11 - 18
8 - 15	21 - 28
16 - 23	31 - 38
24 - 31	41 - 48
32 - 49	51 - 58
40 - 47	61 - 68
48 - 55	71 - 78
56 - 63	81 - 88

The EX-800 can also set the depth of pitchbend (responding to 5 of the most significant bits).

KOR6 DW-6000

The DW-6000 is a 6 voice synth with 64 programmable memories. It features a digital waveform generator system. The DW-6000 will send and receive note data, program change, pitchbend, OSC mod, VCF mod, damper pedal, portamento switch and system exclusive messages.

These Korg instruments neither send or receive velocity, but they do respond to 'volume' information. When sending CC events to a Korg instrument, use the following CC parameters and values.

Function	CC#	Value
OSC modulation	01	0 - 127
VCF modulation	02	0 - 127
Volume	7	0 - 127
Damper Pedal (DW-6000)	32	0 or 127
Porto switch (DW-6000)	33	0 or 127

KOR6 KMS-30 synchronizer

The KOR6 KMS-30 is a useful device which can perform three separate functions. It will synchronize the KEYBOARD CONTROLLED SEQUENCER and drum-boxes to tape via MIDI clock or sync tone. It can also function as a MIDI split box. There are actually a few ways to patch the KMS-30.

```
TAPE  IN: Allows Korg & any other instruments patched to it's
          MIDI outs to be driven from a recorded sync track.
     OUT: Will lay a sync track to tape for future syncing.
  SWITCH: Turns sync mode on or off.
SYNC  IN: will accept a drum clock.
     OUT: Independently selectable 24/48 clock.
     OUT: Independently selectable 24/48 clock.
MIDI  IN: Patch from SEQ MIDI box out.
     OUT: Patch to synths or MIDI drum-box.
     OUT: Patch to synths or MIDI drum-box.
CLOCK SELECT: Tape, Sync or MIDI.
```

KOR6 KMS-60

The KOR6 KMS-60 is a MIDI JUNCTION box. It consists of 1 MIDI INPUT and six

MIDI OUTPUTS. Useful if you have several synths daisy-chained together (will eliminate delay times) or instruments with no MIDI THRU's.

MIRAGE SAMPLER

The Mirage Sampler responds to velocity changes particularly well with velocity controlled APSR's, velocity sensitive osc mix, and KBD scaled Decay. You may have several samples spread accross the keyboard, giving the impression that it is several instruments (although there is only one audio output). You can balance the volume between the two keyboard sides. Instrument powers up in omni mode.

The MIRAGE Operating System Version 3 update adds a lot more MIDI control to the instrument which the KCS can address using Single Byte messages. Among the performance enhancements are aftertouch, volume pedal, breath controller, and local control off.

VOYETRA 8

The Voyetra 8 may be programed to respond as two independent 4 voice machines. Each of these 4 voice instruments can be assigned to any MIDI channel. Make sure the patches you are using are programmed to respond to velocity, pressure, mod-wheels. etc. You may need to change the controllers in the MIDI page.

Only REV4 Voyetras can receive all MIDI parameters. Refer to the Owner's Manual for proper MIDI codes. REV3s will respond to NOTE and velocity information only, and both versions can only send NOTE and velocity information. When configuring the V8 for MULTI-TRACK SEQUENCER, the joystick operates differently. Now joystick left will modulate the left program and joystick right will modulate the right program. Each side will respond to what ever MIDI modulation information is sent on it's respective channel, however. This allows you to still 'play' the joystick along with what ever MIDI control data is being sent.

SYSTEMS 360 MIDI-BASS

The MIDIBASS can respond to program changes and velocity. Since the MIDIBASS can only play one note at a time, make sure your note durations don't overlap into the next note. Sometimes this effect is useful, because it does sound somewhat like a bass player 'tripping over a note'. Different soundchips available for the MIDIBASS do not all cover the same note range.

YAMAHA DX7

The DX7 makes an excellent recording KBD for the KEYBOARD CONTROLLED SEQUENCER because it has good dynamics and sends and receives all MIDI control parameters. Since it has 16 voices, the SEQUENCER can be echoing back to the DX7, without much risk of 'running out' of voices.

A few subtle changes have been made to the DX7's ROMS since their initial release. DX7's can only send on MIDI channel 1, but may receive on any channel. Early DX7's use control parameter 3 for AFTER-TOUCH, and will not respond to AT type events. You may find you want to leave AFT off because it uses up memory very fast.

The addition of the E! modification greatly enhances the DX7, giving it local control off, ability to send on any channel, and a lot more programs in memory.

To specify a PROGRAM CHANGE for the DX7, have the SEQUENCER specify 1 value less than you want on the DX7. The DX7 starts counting at 1 while other instruments start counting at 0. The statement P6 22 from the SEQUENCER would call up program 23 on the DX7.

YAMAHA TX7

A keyboardless version of the DX7, the TX7 can respond to more controllers than the DX7, and has function memories for each program so that modulation depths will differ from patch to patch. The TX7 can only hold 32 programs in memory.

YAMAHA RX11 & 15 DRUM MACHINES

The RX11 features several variations of the most essential drums. There are 8 snares, 3 kicks, 3 closed hats, 2 open hats, 2 cowbells, 2 claps, and 2 rimshots. Concerning MIDI compatibility, the RX11 has a lot of good features. It's drawbacks are: no MIDI THRU and it may only run on it's internal clock when you are creating a pattern on it.

CLOCK:	
SEND	24 pulse or MIDI clock during play only
RECEIVE	24, 48, 96 pulse or MIDI clock during play only
NOTES:	
NOTES	may be sent & received by SEQUENCER.
PATTERNS	may be sent & received by SEQUENCER.
ASSIGN	each drum may be specified to any note
CHANNEL:	
	whole kit may send or receive on any 1 channel.
	each drum may be assigned to any MIDI channel.

There are several options available with the RX11. You may compose patterns on the drum machine and use the SEQUENCER's MIDI clock to drive the RX11 or have the RX11's pulse or MIDI drive the SEQUENCER.

You could record key information on the SEQUENCER which would play the drum machine. This method lets you keep the complete score (music & drum parts) for a song on disk. The SEQUENCER's MIDI clock will START the RX 11, so you should set the drum machine to an 'empty' pattern before playing.

YAMAHA RX15

The RX15 is similiar to the RX11 with fewer features. There are not as many drums and fewer patterns and two audio outputs. One very important feature is the way it sends MIDI data though.

If you want to send MIDI KEY note information to the sequencer, you must set the MIDI TRANSMIT function on. Otherwise it will not transmit key note information.

YAMAHA RX21L

The RX21L contains latin percussion. The sixteen drums are permanently assigned

to keys and panned positions. The 21L cannot send its MIDI key note information out, but it will respond to key note information by putting it in the CHANNEL INFORMATION AVAILABLE mode.

KX76-88 CAUTION

KX76's and KX88's, can have problems when using the MIDI merge feature of the KCS. If you patch a KX76 or 88 to receive data from the KCS, and then send it on to the listening synths, and the KX76, 88 (or at least ours) receives too much MIDI data at one time, it will erase its internal memory and go back to the state it was in when it was shipped from the factory. Beware of MIDI loops and length 0 sequences when using a KX76-88 in this manner.!

C64 and C128 FILE FORMATS

This section is intended for the use of experienced programmers who wish to write programs that use or create data files in the form used by the Keyboard Controlled Sequencer. PLEASE DO NOT CALL DR. T'S FOR CLARIFICATION OR PROGRAMMING HINTS.

Dr. T's Music Software will consider for publication any such programs developed by users. We are not, however, willing to reveal source code listings. Note that all two-byte numbers are stored in the standard 6502 format, (low-byte, high byte).

The Sequencer uses two different types of files, single sequence files and files containing all sequences in memory (SQUALL). The data for each sequence is stored internally as a series of six byte events.

The format for each event is as follows:

Byte 1 - 2	are always the number of time-steps since last event.
Bytes 3 - 5	for standard MIDI events bytes 3 - 5 represent data actually sent out over MIDI when the event occurs. If a DE event, the 3rd byte is 0, and other bytes are irrelevant. For single byte events (*events), the 3rd byte is 64 and the 4th byte is the byte to be sent over MIDI.
Byte 6	is the duration of the note in time-steps, if the event is a note-on event.

For sequence start events, the third byte is the CBM ASCII code for the key that starts the sequence. Thus, for a sequence start event for sequence 1, the third byte is 49, for seq 9 it is 57, for sequence A 65, B, 66 etc. The fourth and fifth bytes are the pitch and velocity transposes increased by 64. The last byte is the number of repeats, if a WAIT was not specified, and 100 + the number of repeats, if a WAIT was specified.

For ST events, the third byte is 1, the fourth byte is one less than the relative sequence number (0-8, for sequences 1-9, 9-34 for A-Z, and 35-127 for 00-92). The fifth byte is the pitch transpose increased by 64, the last byte is the number of repeats, as described in the last paragraph.

For XX events, the third byte is 2 and the fourth byte is as described in the last paragraph. For KY events, the thrid byte is 3, and the fourth byte is the CBM ASCII code for the key whose press is being recorded. A table of ASCII codes appears on page 357 of your C128 System Guide.

A single sequence is stored in a file whose first two bytes contain the length of the sequence in bytes. The remainder of the file contains the sequence data itself.

Sequence data is stored in memory as a string of 3550 consecutive sequence events (totaling 21300 bytes). Starting locations described below refer to the sequence event numbers, thinking of the first event as 1 ... up to 3550. The data for files containing all sequences is stored in the following format:

The number 420, followed by the following data for each sequence in order (1-9, A-Z):

The starting sequence event of each sequence (low-high).

The ending sequence event of each sequence (low-high). If the starting sequence event for a sequence is zero and the ending event is not zero, the sequence key is used for an alternate key assignment. The first byte of the location used for the ending sequence event contains the number of the sequence used in the alternate key assignment.

The number of times the sequence is to repeat if started from the computer keyboard.

The remaining fields are used only for alternate key assignments.

The pitch transpose of each key assignment + 64. The velocity transpose of each key assignment + 64.

The duration transpose of each key assignment + 128.

The starting event within the sequence of the key assignment (low-high). (0 means start at beginning.)

The ending event within the sequence of the key assignment (low-high). (0 means end at the end of a sequence.)

The sequence data starts at byte 423 of the file. The data for each defined sequence are stored, in the same format as that used in single sequence files. The sequence data are followed by the number 280, and the 35 sequence names.

ADDITIONAL C128 FILE TYPES

The C128 KCS has two file types that were not present in the C64 program. ENV files contain the internal status of variables used by the program itself. Its format is proprietary. All sequence files contain the data from all 128 sequences. The prefix for all sequence files is S128. If the program contained more than about 1700 notes at the time data was saved, an all sequence file will be in two parts. The second part will have the prefix PA61., and the same user name. The PA61 files acts as an extension of the S128 file.

The S128 file contains the following data areas:

1. Two byte pointers to the start of all 128 sequences. A value of 0 indicates that the sequence is not in use. 256 bytes.

2. Similar pointers to the ends of all 128 sequences. 256 bytes.

3. The number of times each of the 128 sequences will play if started from the computer keyboard. 128 bytes.

4. The five fields used for alternate key assignments, as described above. 245 bytes total.

5. Names for 128 sequences. 1024 bytes.

6. 10 lines of text comments. 800 bytes.

7. The number of the first unused sequence event. 2 bytes.

8. Reserved for future expansion. 510 bytes.

9. Sequence data. Sequence data is stored in S128 files exactly as it is in the program. The two byte counter prefixes used in the S0ALL files described above are NOT used in S128 files.

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